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VOLUME XIII.
NUMBER 10.

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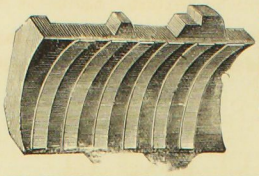

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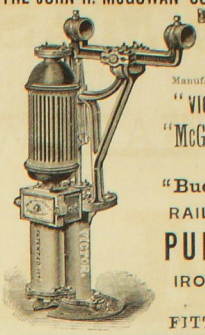

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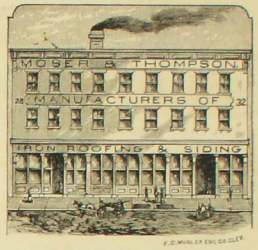

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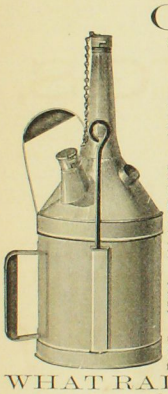

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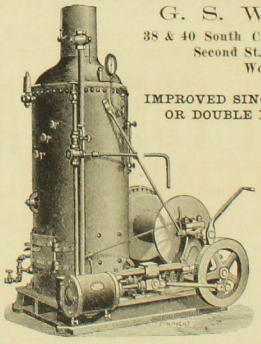

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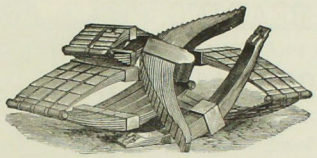
EXTRA TEMPERED,  LIGHT ELLIPTIC

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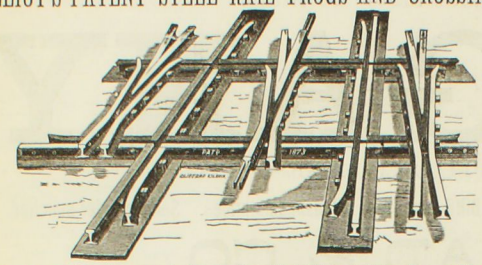

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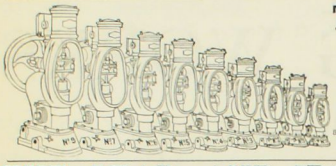

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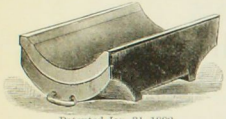

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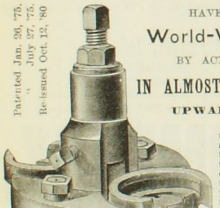

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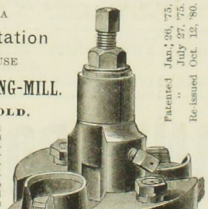

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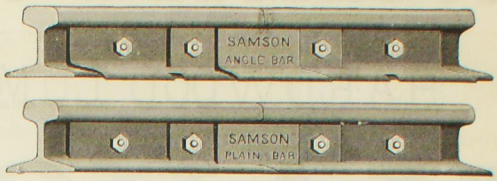

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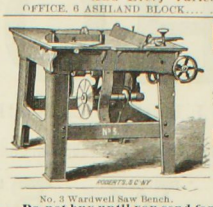

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Wardwell Saw Benches a specialty.

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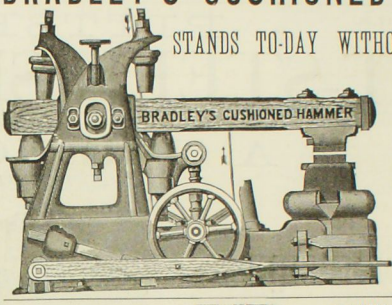

It approaches nearer the action of the Smith's arm than any hammer in the world.

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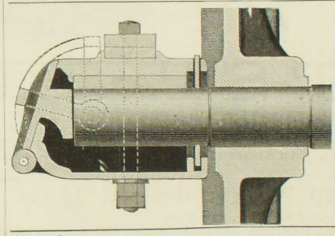

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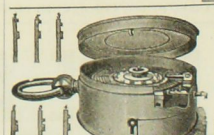

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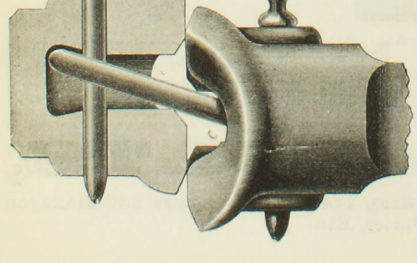

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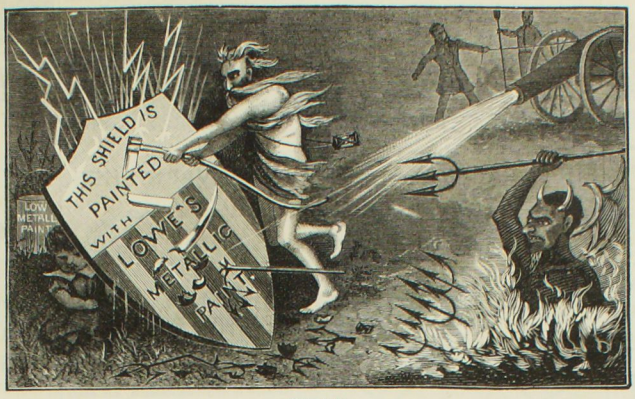

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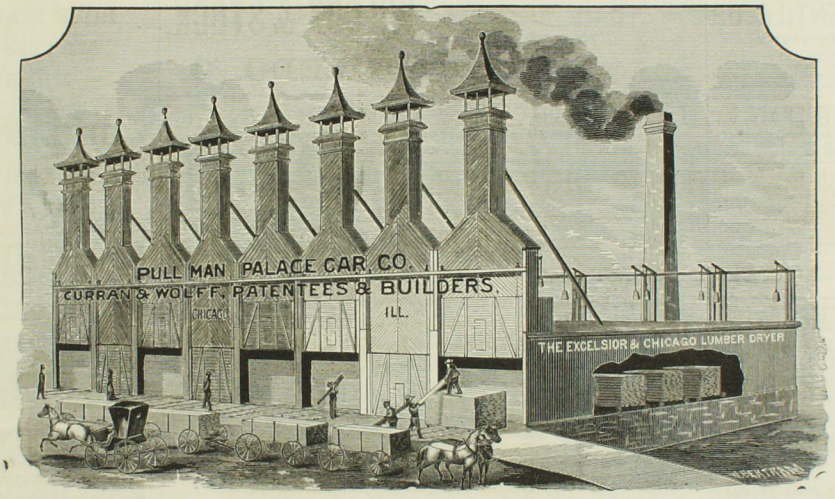

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Atchison, T. & S. Fe Railway, Topeka, Kan	2
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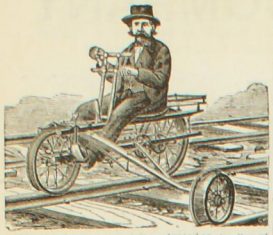

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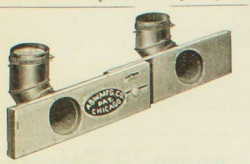

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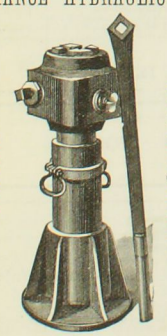

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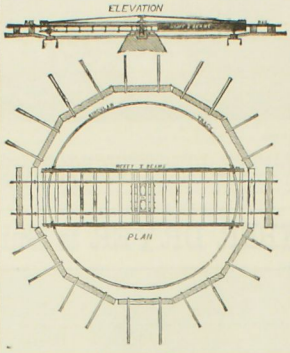

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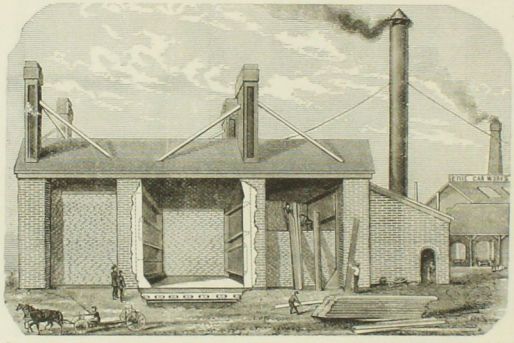

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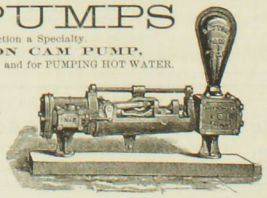

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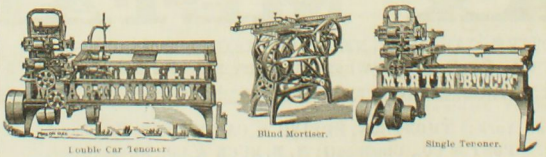

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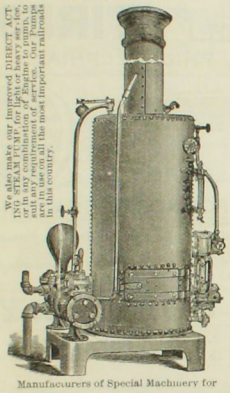

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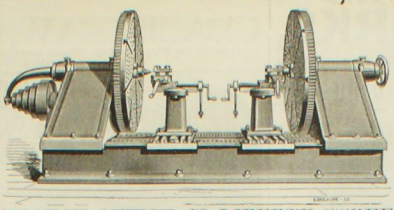

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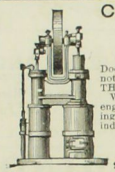

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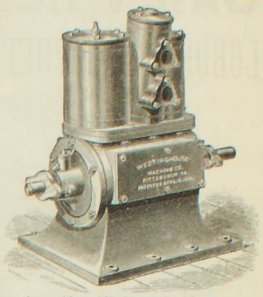

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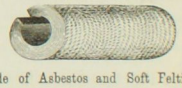

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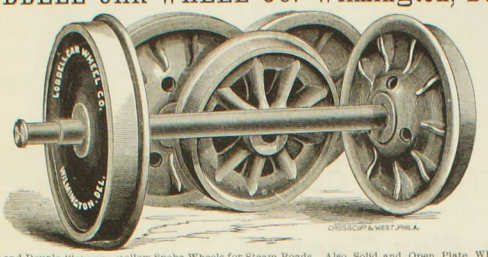

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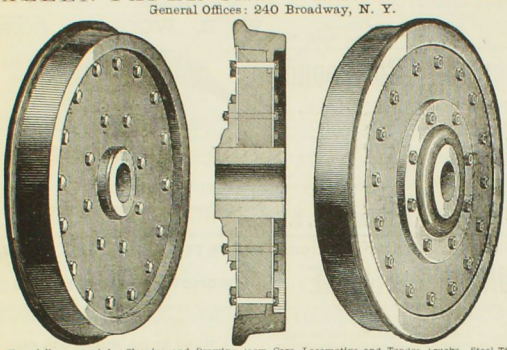

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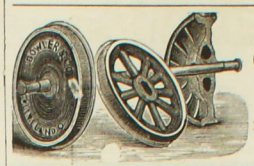

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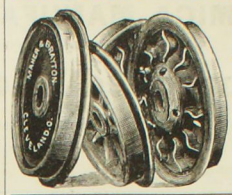

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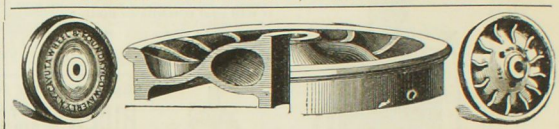

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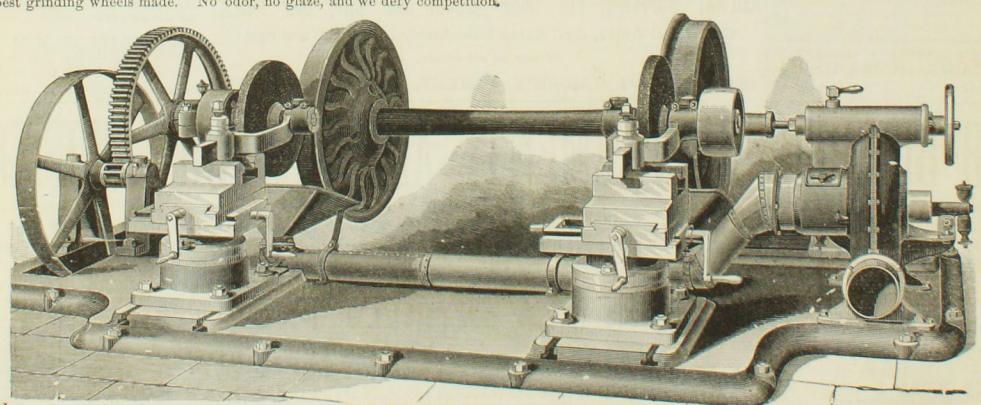

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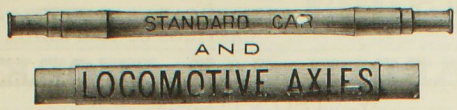

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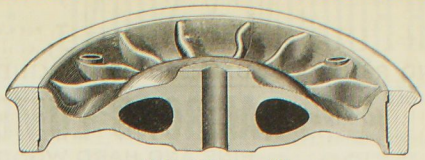

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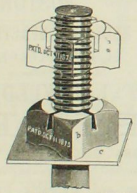

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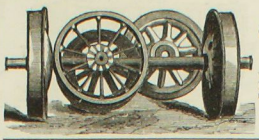

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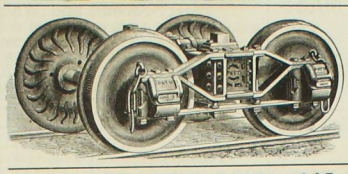

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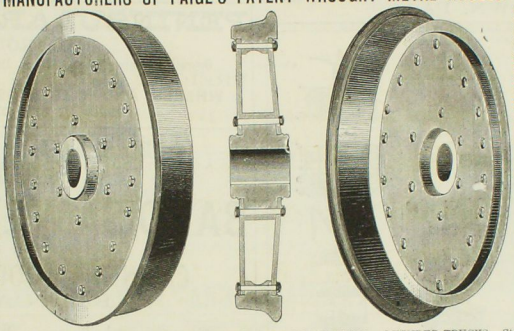

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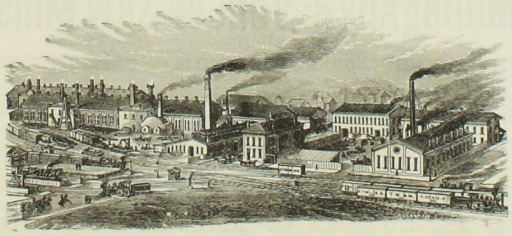

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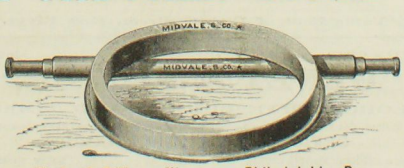

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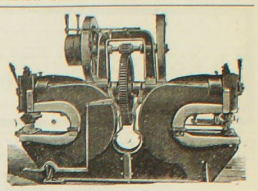

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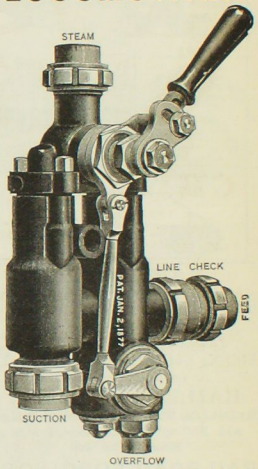

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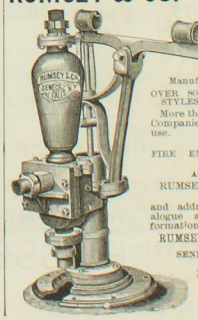

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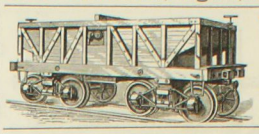

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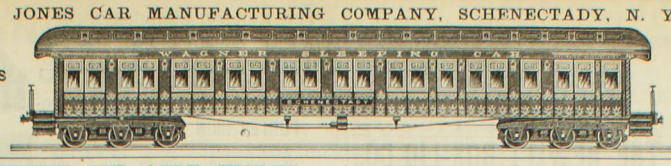

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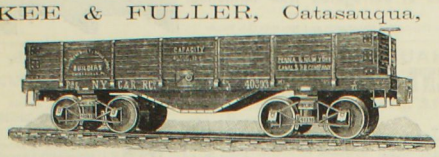

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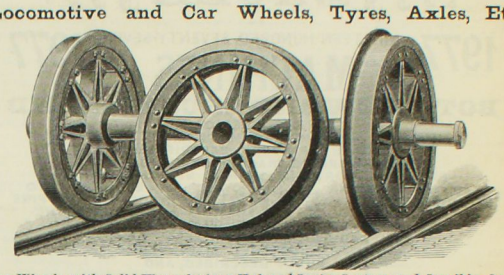

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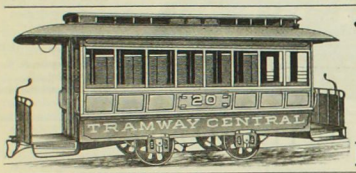

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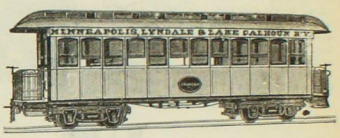

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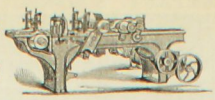

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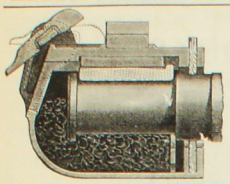

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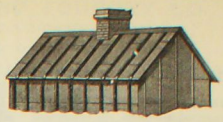

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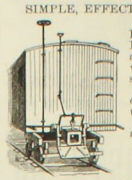

Requires no change of Draw Heads or Links and Pins, except that pin being attached to coupler prevents it being lost or stolen.
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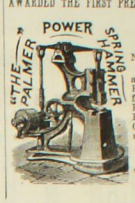

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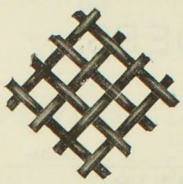

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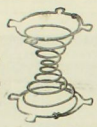
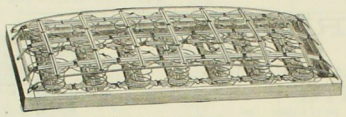
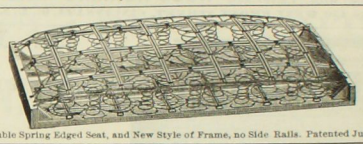
BUSHNELL'S PATENT SPRINGS for Car Seats, Backs, Berths and Mattresses. Best in the *world*. Adopted and used by nearly all of the leading Railroadand Car-Builders in the United States and Canada.




Spring in a Car Seat Frame.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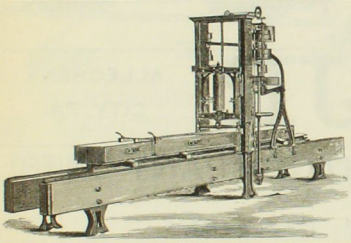


THE JOHNSON PATENT RAILWAY HEATER,
For Generating Steam, and for Steam and Water Circulation,

Forming two independent currents, hot water for moderate weather, reinforced by steam for severe cold. Heating capacity estimated at 125 *per cent. over any other apparatus in use, with one-third less fuel.* Noiseless and Non-explosive in operation, constructed without Valves or Checks, and requiring no mechanical arrangement for safety,—a device with open pipes. Steam circulation without pressure, affording heat free from smoke, gases, or the objectionable odor arising from over-heated steam. The invention consists in the construction and arrangement of mechanical devices and philosophical combinations through which the results are obtained. The accompanying drawing will place the system in an intelligible form.

The substantial construction and guarded arrangement of the *Johnson Heater* ensures safety from fire or explosion to a far greater degree than by any device heretofore produced. The success of this system of heating is now fully demonstrated by its application upon a large number of passenger cars on the leading railroads in New England.

The official communications which are herewith presented give indisputable evidence of this fact, and are in themselves sufficiently explicit to require no further comment in evidence of the value of this improvement in point of comfort to the passenger and economy for those who adopt its use.

COMMONWEALTH OF MASSACHUSETTS, BOARD OF RAILROAD COMMISSIONERS, No. 7 PEMBERTON SQUARE, BOSTON, June 24, 1882.

CHARLES F. CHOATE, Esq., *Pres. Old Colony R. R. Co.:*

Dear Sir:—The Board has received yours of the 22d inst., asking approval of the Safeguards for protection against fire furnished by Johnson Railway Heater. The Commissioners have examined the Johnson Heater, and at a meeting of the Board this day it was voted that the "Johnson Railway Heater," for warming passenger cars, be and is hereby approved. Yours respectfully,
WM. A. CRAFTS, *Clerk and Sec.*

ROBERT JOHNSON, *Treas. Johnson Heater Co.:* OLD COLONY RAILROAD CO., BOSTON, June 20, 1882.

Dear Sir:—We have used the Johnson Heater for our passenger cars the past three years. They have given perfect satisfaction in every respect during the extreme cold weather. They kept our cars warm as we desired them to be. I never have heard a word in regard to the heaters, except in commendation of them. We have eighty-two of them in our cars, and shall add more this fall. I consider the new Heater very much superior to the old. It works perfectly. Respectfully yours,
A. GLEASON, *Master Car-Builder.*

[GEO. E. B. JACKSON, *Pres.*, PAYSON TUCKER, *Supt.*] MAINE CENTRAL RAILROAD, PORTLAND, ME., June 19, 1882.

ROBERT JOHNSON, *Treas. Johnson Railway Heater Co.:*

Dear Sir:—We have used the Johnson Heater in our passenger cars for the past two years. They have given perfect satisfaction in every respect. During the extreme cold weather of last winter they did all that you claim for them, and our cars during that time were as warm as we desired to have them. Yours truly, PAYSON TUCKER, *Supt.*

ROBERT JOHNSON, *Treas. the Johnson Railway Heater Co.:* OLD COLONY RAILROAD, SUPERINTENDENT'S OFFICE, BOSTON, MASS, June 22, 1882.

Dear Sir:—We have over eighty of your heaters in our passenger cars, and they give entire satisfaction, and during the cold weather of the last winter the cars furnished with them were kept warm and comfortable. Very truly yours, J. R. KENDRICK, *Superintendent.*

OLD COLONY RAILROAD, OFFICE OF PASSENGER TRANSPORTATION MASTER, BOSTON, Jan. 11, 1882.

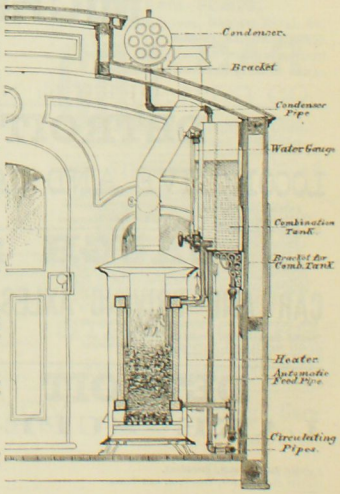
ROBERT JOHNSON, Esq., *Treasurer Johnson Heater Co.:*

Dear Sir:—It gives me pleasure to testify to the excellence of the "Johnson Heater," which is in use on this road for the third winter. It is absolutely non-explosive, a great saver of fuel, and more easily managed than an ordinary coal stove. The temperature of the cars is uniform throughout, and gives great satisfaction to the officers and patrons of the road. We are using over fifty of them at the present time, and we shall introduce them in fifteen new cars now building, and are putting them in the older ones as fast as opportunity presents. The largest number of the cars referred to seat seventy-four passengers. Very sincerely yours, J. C. SANBORN, *Passenger Transportation Master.*

EASTERN RAILROAD COMPANY, OFFICE OF MASTER OF TRANSPORTATION, BOSTON, March 23, 1882.

ROBERT JOHNSON, Esq., *Treasurer Johnson Heater Co.:*

Dear Sir:—It gives me pleasure in testifying to the excellence of the "Johnson Heater," which we now have in use on this road. It is absolutely non-explosive, a great saver of fuel, and more easily managed than an ordinary coal stove. *The Thermometer has shown 90° within 40 minutes after the fire was started.* The temperature of the cars is uniform and gives good satisfaction to the patrons of the road. We have at the present time twenty-six of them, and shall soon add more. Yours truly, D. W. SANBORN, *Mas. Trans.*



THE JOHNSON RAILWAY HEATER COMPANY,
Office, No. 8 Exchange Place, Boston, Mass.
JOHN WOOLDREDGE, President. J. W. PICKERING, Secretary. ROBERT JOHNSON, Treasurer & General Manager.

The Heater can be seen at the Old Colony, Boston & Providence, Fitchburg, Boston & Maine, and Eastern railroads, in Boston; also, at the Maine Central Railroad, in Portland, Maine, and at SMITH & ANTHONY'S, Nos. 52 & 54, Union Street, Boston; Boston & Albany, New York, Lake Erie & Western, Michigan Central, Central Vt., Providence and Worcester, and at Pullman Palace Car Works, Pullman, Ill.

Workshops, No. 30 Union Park Street, Boston, Mass.

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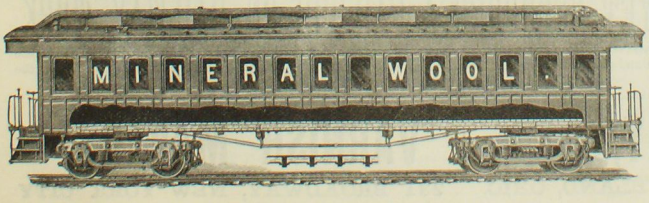

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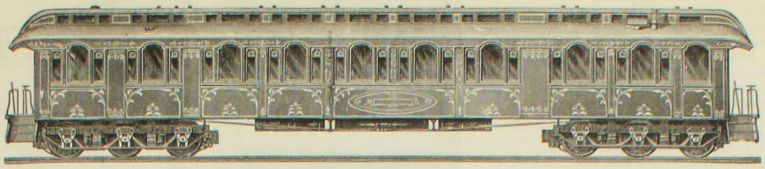


DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XIII. NUMBER 10. | OCTOBER, 1882. | SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

Miscellaneous Items.

THE New York Locomotive Works, at Rome, N.Y., employ 175 men, and the number is being increased every day.

THE Tredegar Company, at Richmond, Va., recently delivered 100 gondola cars to the Western North Carolina road.

THE Wason Car and Foundry Company, in Chattanooga, Tenn., are doing a large business in car castings and repair works.

THE Cheshire Railroad shops, at Keene, N. H., have lately completed a new and handsome passenger car for the road.

THE Erie (Pa.) Car Works have a contract to build 200 cars for the Northern Pacific Railroad, and are sending out nine a day.

THE Buffalo, Pittsburg & Western have ordered 1,000 new coal cars, 500 freight cars and ten new locomotives, in order to carry the increased business of the road.

THE New York & New England shops at Norwood, Mass., have been extended by the addition of a new paint shop 250x80, and a new blacksmith shop 60x120.

THE Swissvale (Pa.) Car Company has just finished a parlor car for the Pittsburg, and Lake Erie road, and is making arrangements to build 400 Zimmerman refrigerator cars.

THE Baltimore Car Wheel Company are building new works in a new location in that city. The grounds comprise an area of ten acres. The new works will have a capacity of 400 car wheels a day.

THE Chicago, Milwaukee & St. Paul road has added to its equipment 9 first-class coaches, built at the Jackson & Sharp Co.'s works, at Wilmington, Del. The inside finish is in ash and oak, with mahogany trimmings.

WORK is being pushed to the utmost on the Connotton Valley Railroad between Coshocton and Canton. At the bridge over the Tuscarawas River, and in all the heavy cuts, two sets of hands are employed, and the work is going on night and day.

THE Detroit, Lansing & Northern Railroad Company have contracted for the construction of extensive shops at Ionia, Mich. The buildings are to be of brick, except the wood-working shop. The contract was awarded to Detroit parties for $111,459.

THE new passenger station of the New York, New Haven & Hartford Railroad, at Meriden, Conn., is nearly completed. The structure is of brick, with stone trimmings, and two stories high. The interior is in yellow pine and black walnut, and on the outside there is a roofed platform, 500 feet long and 25 feet wide, floored with asphalt.

THE Old Colony Railroad shops in Boston are soon to build a new passenger engine with 18x24-inch cylinder and six-foot drivers, to run on the steamboat express between Boston and Fall River. It will weigh in working order about 43 tons. The shops have just completed the last of a lot of twenty passenger coaches.

THE Fitchburg Railroad Company is building at the Charlestown shops six baggage cars 50 feet long, 100 eight-wheel coal cars, and changing 100 box cars into refrigerators. The baggage cars have Globe ventilators. Work is also in progress on the series of new passenger cars noticed in our last issue.

"CAR-COUPLER inventors," says the *Railway Age*, "do not weary in well-doing. Of the 28 inventions pertaining to railways reported for the week ending September 5, eleven are for car-couplers, and this is not far from the weekly average. The longer the Master Car-Builders' committee delay action the more formidable will be their work."

THE shops of the New York, New Haven & Hartford Road, at New Haven, are at work on the new passenger equipment elsewhere noticed. The paint shop has recently been enlarged by an extension of the old one, and is now 300 feet in length, with eight tracks and room for 32 cars. The new work is in various stages of progress from body framing to painting.

ALL the engineers, firemen, conductors, brakemen and baggage-masters employed on passenger trains on the Pittsburg, Cincinnati & St. Louis road, are now required to pass an examination relative to the construction and working of the Westinghouse brake, with which all locomotives and cars used on passenger trains are equipped. The examination will consist of explanations of the brake, its cylinders, connections, force, how to test its efficiency, how to make up a train with air-brake connections, and of inspection while making a trip.

NEARLY the entire works of the Missouri Car & Foundry Co., at St. Louis, were destroyed by fire on the 16th ult. The finishing, paint, blacksmith and door shops, were saved. All the rest were burned, together with their contents, and also the lumber and building material on hand. The foundry buildings, being separate from the shops, were not injured. The entire loss is said to be $200,000, upon which there was $152,000 insurance. The shops will be immediately rebuilt. The fire will cause no delay in filling orders, as all the new work and repairing will be done at the Indiana Car Works, at Cambridge City, Ind.

A TEST was recently made at Oswego, N. Y., of passenger car springs known as "Cliff's Acme Elliptic." The test was made on the president's car of the Delaware, Lackawanna & Western road. The weight of the car without load is 70,000 pounds, and after being equipped with the springs it was run over a rough section of the road upon which the iron rails still remain. A number of railway experts were in the car, who concurred in the opinion that no easier riding car could be desired, and that it was all due to the springs above named, supplemented by Cliff's "graduated equalizer" springs on the equalizing bars. The Cliff & Righter Co. are equipping a large number of freight cars with this last named spring.

THERE are few things more troublesome to an engineer than a hot crank-pin, and it is sometimes very difficult to get at the real reason why it heats. Among the principal reasons for heating are: The mainshaft is not "square" with the engine, or, that the pin is not properly fitted to the crank, or perhaps it is too small in diameter, defects which are to be remedied as soon as practicable. Heating is often caused by the boxes being keyed too tightly, or by insufficient lubrication. There are now several good self-feeding lubricators in the market which will supply the oil to a crank-pin continuously; these are recommended rather than the old style of oil cup, which was not only uncertain, but doubtful in its action.—*The Indicator.*

A PRETTY big concern is the London & Northwestern Railway, of England, with its 1,700 miles of line and principal termini at London, Liverpool, Holyhead and Carlisle, with connections to Edinburg and Glasgow. Its capital is about $500,000,000 and there are 40,000 persons employed to operate it. The management is in the hands of a board of thirty directors, who attend to details through various committees—and no member of the board is allowed to speculate in the stock. Every member is expected to give the most of his time to the road one week in each month. Many improvements have recently been introduced for the comfort and convenience of travelers, one of which is the checking of baggage so that it will be delivered to the owner's address at the destination.

A HOLYOKE, Mass., man has invented a new safety car-heating system, designed to do away with the stoves in railway cars. A generator of steam is placed in the baggage car, and the connecting pipes transmit the steam through the train. The ingenious points of the invention are the successful surmounting of the obstacles heretofore never overcome. The pipes from the baggage car are carried through the top of the cars and drop to position under the seats. The couplings are brass valves screwed on to the pipes and supported from the end of the car by a hanger with a pulley. When two cars are joined, these couplings slip into each other and push back both valves, allowing passage to the steam. When the cars are separated the pully on which the couplings rest, and which slide on the hangers, is pushed up by a connecting-rod, the couplings part and the valves close by their own weight.

RED oak is rapidly growing in favor, and the prospect is that at no distant day it will be one of the most popular woods. A few years ago it was considered almost worthless. There was no market for it, and the men who owned red oak stumpage were willing to sell it for a song. The beauty of the grain of the wood was overlooked. Other light woods, not half so beautiful as this one, were chosen in place of it. But a wonderful change has taken place. The leading architects of the great cities are seeking it for use in the finest and most fashionable houses. Its beauty is being appreciated not only at one point but everywhere where fine work is required. The Michigan men who own large quantities of stumpage now know that they have something as valuable as the white oak of that State, which to such an extent has been cut off. It is a notable instance of the ups and downs of woods.—*N. W. Lumberman.*

A REFRIGERATOR CAR, built by the Lorens Refrigerator Car Co., of Hamilton, Ohio, is described as follows: "In the walls of the car is an air-chamber, through which the fresh air descends from the top, being cooled on its way down, and penetrates the interior through a strip of perforated metal surrounding the edges near the floor. The incoming air, cooled by ice in racks at either end of the car, forces the foul air to the roof, where it escapes through six flues. Lengthwise across the floor is a drain which carries off the ice drippings through an aperture in the center. The Lorens principle has been applied with great success. The car is so dry that a match can be struck almost anywhere on the walls. This absence of moisture destroys all sweating and rotting of the wood, thus making the car the superior of all others in the matter of durability. Old refrigerator cars are reconstructed by the company on this plan. The ventilation, it is claimed, always keeps the car sweet, no taint or bad smell remaining in it after a long journey."

THE narrow-gauge people are still striving for greater tractive power. As the traffic increases their resources are severely taxed, and, burdened as they are with small cars, they find that long trains are necessary, and, consequently, to get power to do the work, unusually heavy engines are needed. As they are usually limited by their very light rails, the weight on each driver has to be kept down. Consequently, even for passenger work, they have had to resort to "moguls," and "consolidations" are commonly used for freight. One of the latest of these engines, built by the Baldwin Locomotive Works, has 10 drivers, an overhanging fire-box back of the drivers, cylinders 16 in. in diameter by 20 in. stroke, 37-in. driving-wheels, and a total wheel-base of 15 ft. 5 in. The rigid wheel-base is 9 ft. 9 in. The boiler, which is intended to burn wood, is 52 in. in diameter, with flues 13 ft. ¾ in. long, and a fire-box 43½ in. long, 48 in. wide, and 54½ in. deep. These engines are very light on the rails, the great number of driving-wheels giving the necessary adhesion without excessive weight upon any one pair.—*Ex.*

MR. S. H. TERRY has invented an automatic brake for freight trains, which the Chicago *Tribune* thus describes:

"In adapting this brake to the cars, Mr. Terry uses simply the momentum of the trains crowding them together when the engineer has shut off steam from his engine and applied the engine brake, if the locomotive be fortunate enough to possess such an instrument. The machinery is very simple. The draw-bar is about double the length of the one now in use. One of the axles in the forward truck is attached to a worm-screw or scroll divided into two sections, one working right, the other left. Attached to this draw-bar is an upright pin, which can be so regulated as to work in either the right or left-hand screw. When the train crowds together, the draw bars are thrust inward, the upright pin enters the scroll, its revolutions work on a lever which at once applies the brake, and this acts almost simultaneously on the entire train. The mechanism is simple, and the inventor says it can be applied to all freight cars at a moderate cost. In the model it works admirably. How well it will work in practice can only be determined from actual experiment. It is understood that one of the largest railroad companies is going to apply it to a dozen or fifteen cars and subject it to the most crucial test."

TWENTY THOUSAND men are now at work on the New York, West Shore & Buffalo road between New York and

Syracuse, with all necessary engines, cars, teams, machinery, tools and other appliances. It is expected the entire roadway to Syracuse will be ready for track superstructure before December, and the track laying, now in progress at several places, will be completed to Albany and Syracuse in January. The third division can be completed, ready for business, before September, 1883. One-third of the entire roadway will be level. The maximum grade going east, except one grade of 30 feet, is 20 feet to the mile; 80 per cent. of the entire roadway is on a straight line. The maximum curves are four degrees, and they exceed two degrees on only 23 miles of the road. The bridges are of iron, the culverts of masonry, and every portion of the work is being constructed after the most approved methods—the result of the experience on other roads. The track will be laid with steel rails weighing 67 pounds per yard, and well ballasted. Ample sidings and turn-outs will will be provided. Station and other buildings will be constructed from new designs, with a view to convenience and attractiveness. The entire equipment will be provided according to the most approved patterns, and each class will be uniform in character and design.

THE proposition to use cast-iron links for locomotives will strike many engineers, no doubt, as preposterous. Such links, however, have been for a long time very successfully used by many railroad master mechanics, and it seems that the practice is spreading. During the last ten years many have used cast-iron links exclusively, and little or no trouble has been experienced from breakage. Some engineers, indeed, say that they have never known of a broken cast-iron link where there was not some other serious breakage. On some of the New England roads these links are not only considered cheaper, but much superior to wrought-iron links case-hardened, and the same opinion was expressed by Mr. Wilder at the Master Mechanics' Convention, who has been using links of this kind for two years on the Erie. On some railroads it is the custom to make up links and link blocks in numbers ahead, so that when an engine goes into the shop, or even into the round-house, if an accident happens, or for any reason it becomes necessary to replace the link, it can be done at very short notice, and practically without fitting. On some roads, indeed, duplicate links and blocks are kept for every style of engine used. One point of special advantage in the cast-iron link is that the wear is very much less than on the wrought-iron link, because they are chilled, giving a much harder and more durable surface than can be obtained from case-hardening. Sometimes this has been tried by putting different kinds on the opposite sides of the same engine, when the superiority of the cast-iron ought to be very plainly shown.—*Mechanic.*

Construction of Passenger Cars.

Some railroad accidents which have happened within a year or eighteen months have caused railroad companies to take several precautions, with the hope of saving life, which are of questionable value. Axes, for example, are placed in every car, and fire extinguishers are also provided. It will be found, very probably, that at the times when these are most needed, the accident has been of a character to place them beyond the reach of passengers who could use them to advantage. We very much doubt whether in case of accident the most rapid use of an extinguisher would be able to save the car from fire. So long as we have to burn coal in our engines, so long there will be danger of fire on a wrecked train. About the most important radical work which railway companies can do for the safety of passengers is to entirely change the character of the interior brasswork of their cars. As at present made, lamps and hanging baskets are bristling with sharp points and corners. On some roads even the seats are not without projecting edges, which would terribly bruise passengers in case of an overturn. All this should be changed, and nothing should be allowed upon the interior of a car likely to produce wounds upon passengers.

The important aim in the construction of a railway car is to keep the car intact in case it goes over a bank. If this is done there is little danger that passengers will be killed. In the history of accidents in this country it will be found almost universally true that when a train meets with an accident and the car walls are strong enough to protect the passengers, comparatively little injury is done, while, if the car goes to pieces, no matter how slight the accident, people are invariably killed. For example, on the Pennsylvania road, a few years ago, an express train ran out of an open switch at probably a speed of 50 miles an hour, ran into another train and struck with sufficient violence to demolish an express car. The shock was terrific. The cars were thrown around badly, but beyond the smashing of platforms the cars were uninjured. Passengers were badly bruised, but no one was seriously injured or killed. On an Eastern railway, two or three years ago, when starting from a station a passenger train ran out of an open switch, or was dragged out in such a way, that one of the cars ran over a pile of rails. The speed was slow, but it so happened that the floor of the car was wrecked. The result was the killing of several people. We may, therefore, take it as a rule that a strong car is a safe one, even though it rolls down a bank or is thrown off into the fields bottom up, as was a certain sleeper that we well remember.—*Iron Age.*

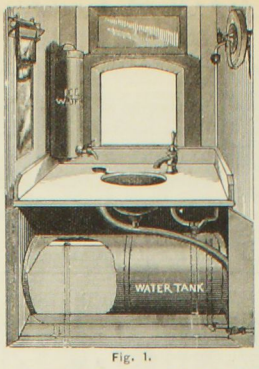


Fig. 1.

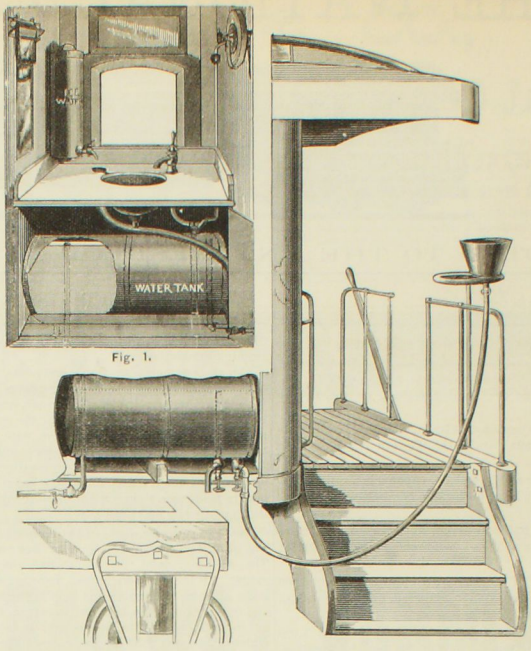
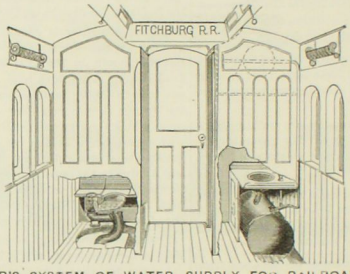


Fig. 2.



GRANGER'S SYSTEM OF WATER SUPPLY FOR RAILROAD CARS.

OUR last issue contained a brief description of some new passenger cars of the Fitchburg Railroad Company, in which allusion was made to the Granger system of supplying water to the lavatories and closets under a strong pressure from the air-brake reservoir, and also for extinguishing fires in case of accident. The mechanical details of the system are shown in the accompanying cuts.

Fig. 1 shows the water tank under marble slab and wash bowl, with part of its side cut away in front of the pipe which admits air pressure from air-brake pipes for use in expelling the water either through the pipe to the hose reel, the water basin, or across the car to the water closet. The air supply is delivered above the water in tank. The water pipe at the right starts from bottom of tank. The tank is of galvanized iron, and is tested at 150 pounds pressure. It is inexpensive and safe, as well as entirely out of sight and out of the way.

The fire-hose reel above the slab is of brass, nickel-plated, and runs loose upon the body of valve, which may be opened by its wheel in front to admit water to the hose, said hose being intended for fire purposes only. The reel contains fifty feet best quality ¾-linen hose, and is wound double. When unreeled, the bite falls from centre hook of reel and the hose, with one end attached to valve, will be entirely released, and is of sufficient length to reach the extreme end of this or the next car, for use inside or out, as emergency requires. This fire-protective feature will commend itself to all.

Fig. 2 shows exterior end of car, with side cut away, showing position of tank, valves, and piping, with hose connected for filling tank with water by use of funnel placed in the brake wheel on the platform, unless a direct connection can be made with city water mains. It will be observed that the cock in air pipe to the left is closed, to keep back air supply in automatic reservoir, and the valve of overflow pipe, shown by dotted lines in extreme right, is open to let out air from tank, till water fills to level of top of overflow pipe, as indicated by dotted lines. Both the filling and overflow valves, by their stems, are opened outward from within the tank, and when closed all water drains out, and none is left for action of frost. The air pipe also extends above water line, so as never to be affected by contents of tank. The short hose and funnel here shown are carried in closet of tank for use only where hydrant pressure cannot be obtained. Ordinary hydrant hose coupling would attach to filling valve, and under hydrant pressure tank would fill rapidly, say in two minutes. When the tank has been filled and valves closed, the cock in air pipe is to be opened, admitting air pressure from automatic reservoir for use in supplying what water may be required before making up of the train and re-supplying pressure from locomotive.

Fig. 3 shows inside end of car, having the lavatory on the right and water closet on the left, with partitions cut away to show position of water tank and closet. The closet bowl is shown with its contents of water, and the foul air trap and discharge pipe in position over the hole cut from bottom of car.

Further particulars may be obtained by addressing the inventor, A. M. Granger, 177 Devonshire street, Boston.

Ready Mixed or Prepared Ground Colors in Railway Paint Shops.

[Paper read by Mr. John H. Will, Master Car Painter of the New York Central & Hud on River Railroad, at the 13th annual meeting of the Master Car Painters' Association.]

In common with most painters who have served a regular apprenticeship, I have always and still entertain prejudices against the mass of ready mixed colors and paints turned out by grinders and manufacturers. When I learned my trade we were entirely dependent upon our own shop mixtures, and, to a considerable extent, for the grinding of our colors and paints. It is not to be denied, however, that by the aid of improved mills run by steam-power, manufacturers have been able to produce pigments, colors and paints far superior to those mixed and ground by hand in the shops. Yet my experience in the use of prepared and ready mixed colors is not extensive, and I have not wholly overcome my prejudices and objections to them. My objections to them are, that we can not safely rely upon their quality, or even the honesty with which

they are compounded, there are so many different substances that are called by the same name. We can find ochres, for instance, in the market, which have little if any of the natural pigment in them; many of them are artificial products. The same with umbers, with carmines, with vermillion; in fact, with nearly all of our colors and pigments that it will pay to imitate. And manufacturers are tempted, driven, it may be by competition, to mix their ready-prepared paints with these cheapened imitations. It may be suggested, in reply to these objections, that we should be subject to the same imposition in supplying material for our own mixing; but it is much easier to detect adulterations and imitations in the crude material than in the mixed paint or color.

My own objections are not based on any considerations of professional jealousy. If prepared paints can be furnished to us in better condition for use and cheaper than we can produce them I do not apprehend that our occupation will be belittled or interfered with. We shall still have enough of intricacies and practical questions to determine, and our technical knowledge of the nature and mixing qualities of paints and colors will not be in less requisition when they shall furnished to our hand ready for use.

In the first place, assuming that we can surely rely upon the skill and honesty of mixers and grinders, it can not be denied, as I have intimated, that large manufacturers can better secure uniformity of quality and color. We must assume that if the manufacturer is paid a fair profit for his risk, he will prefer to turn out good and reliable paint. To do this, he will secure the services of experts, and, above all, one who has had experience in the use and application of paints—in other words, a good painter, to direct the selection and mixing of the pigments and vehicles of the paints he shall compound. They will be able to secure the services of men versed in the chemical relations of the colors he mixes to produce a given tint of shade, and having at their command a large stock and variety of material, they will always secure a uniform result, both as to quality and tone of color. Besides, a railroad like the New York Central & Hudson River, whose extent necessitates a large number of shops scattered along the whole route, having selected a tint for body color, will be able to turn out all their cars of a uniform tint. Then a car can be run into any shop along the whole line for repairs with a certainty of being intelligently handled by the master painter of that shop, though he did not paint it in the first instance. He has at hand a paint mixed after the same formula and subject to the same treatment, and can patch or repaint without accident to matching and without the risk of making a mistake, either in respect to quality or tint.

My second point is, that the greatest degree of durability in paints may in this way be secured. We all know that the permanence of colors in secondary or mixed paints depends in the first instance on the chemical relations of the colors and pigments employed in producing the desired tint of color. These secondary or mixed colors may be produced by various combinations. I mean to say that the same tint may be made by different mixtures. Our rule in mixing is, of course, to use the least number of colors possible to secure the desired tint or color; also the chemical relations of the ingredients must be kept in mind.

I have no doubt that the quick fading or changing of many colors is due to the fact that unfavorable effects are produced by the chemical changes which take place between colors after they are applied. We know, for instance, that vermilion is affected by contact with iron or lead in any form, whether by the mill in which it is ground, or any paint with which it may be mixed or applied. I do not mean to say that we could not in our shops compound and mix in a small way just as durable paint as any manufacturer can, provided we had the same choice of materials and colors. Although it is not to be expected that we shall be chemical experts, yet if we have at hand the necessary choice of material, we ought to know how to make as good, if not the best and most durable, combinations. But the day of the slab and muller has gone by, nor can we rely even upon hand mills to grind and mix colors for a large railroad or car shop.

Is it strange, then, with the increased and increasing number of pigments in use, that we should avail ourselves of the improved facilities and expert knowledge available in a large concern for the combination and mixing of colors and paints? The fact that we can not always rely upon the prepared colors and paints that are recommended to us, does not affect my argument, for I am supposing that the paints shall be mixed and prepared under the direction of competent experts, and that the whole shall be done honestly, and with a view to produce the very best results. Nor is a competent and reliable manufacturer a merely suppositious case. In our shops we use the ground colors and prepared paints of a house in the city of New York. No secret is made of the formula upon which they are mixed, and I should not have the slightest hesitation in relying upon their skill and honesty. There are, no doubt, houses just as reliable scattered all over the country, whose interest it would be to make their supplies just what are needed for good and economical work.

This brings me to another benefit which would result from the use of ready-prepared colors, and that is the question of economy. It needs no argument to show that, if we can be sure of the quality of paints furnished us, they can be produced on a large scale, and with the facilities of a large factory, cheaper than we can grind and mix them in our shops. I believe that the best paint is the most economical; and I am supposing that we can, through manufacturers, secure the very best through the use of the very best material, skillfully and honestly manufactured. The physician knows how to mix and compound medicines, but he relies upon those who make it their special business to do this mixing and compounding. He gets better prepared medicines and extracts with a saving in expense. Carriage painters in both large and small factories, with few exceptions, use prepared coach colors, and their superiority both in respect to quality and economy, are now very generally acknowledged. So in many railroad shops, the mass of paints used are furnished ready prepared. As I have said, the fact that these paints are faulty, because prepared by those who did not avail themselves of the best practical skill, or were dishonest in their preparation, has nothing to do with the question.

If, then, we can hold any responsible party accountable for the quality of the paints he shall furnish to the shops, I claim that we are in the way of placing responsibility for any bad work which comes from the paint shop. As it is now, the painter is held accountable for bad work which may result from the use of poor material.

When the painter or manufacturer selects his own materials he becomes responsible for the result of his combinations and the quality of his product. Under the system now generally in vogue, the painter is called upon to handle and combine materials bought by another. A job of work is to be done; it may be the painting of a depot, or the finishing of a lot of passenger coaches. A requisition is made for so much lead, oil, colors, and the other material as are supposed necessary to do the work, and they are selected by some one who perhaps knows little or nothing of the technical properties and special qualities of the articles required. A watchful superior officer discerns that the new cars soon become dingy, and infers correctly that there is something wrong. He notifies an officer in charge, and the master car-builder is instructed to inquire into the matter. The master painter is held accountable, but he insists, and rightly, that he did the very best possible with the material furnished; and it is readily seen that the fault may be in the material, for the quality and working properties of which he is not accountable. If further investigation is made, it will be found that the responsibility will be hustled about from the paint shop to the paint-supply dealer, and it will in all probability be left vacillating between the paint man and the purchasing agent. Very likely, too, the varnish will come in for its share of the condemnation.

Now, if a responsible party, like a large manufacturer, could be held accountable for the quality of the material, as well as for the skill and honesty of the making, we should, I think, be in the way of fixing the responsibility for bad work from the paint shop where it belongs. We must expect to be held responsible for any failure on our part, through want of skill and ability, to do the work we attempt; nor could we complain if we were held responsible for the working qualities of material which we selected and approved; but since this is out of the question, then I think the accountability of a responsible and honest maker of ready-prepared ground colors and paints would relieve the paint shop from many unjust aspersions, and at the same time secure to our employers uniformity of results and durability of work in the paint shop, with the greatest economy and with a fixed responsibility.

Removing Old Paint from Passenger Cars.

[Paper read by Mr. Robert McKeon, Master Car-Painter of the New York, Pennsylvania & Ohio R.R., at the 13th annual meeting of the Master Car-Painters' Association.]

The removal of old paint from a car body previous to repainting is often necessary when the car has had repeated coatings of varnish which has become cracked and decayed, and the life and elasticity of both paint and varnish are destroyed.

This subject is of some importance, for we have yet to find the road that has no cars with cracked paint after they have been in constant service eight or ten years, and have been re-varnished at least once in two years.

Numerous methods have been employed for removing old paint, but how few of them have given satisfactory results after a thorough trial? A large majority of our railway paint shops are so situated that gas is not to be had, and the paint must be removed with such appliances as we have at our command in the shop. We may have employed different methods, but it is for us to consider at this time which is the most approved plan, which can be best determined by comparison. My first experience in taking off old paint was by the application of hot irons. You all know what those were—5 × 8 inches in size and 2½ inches thick. This was a tedious and not a very safe method; we found it no boy's play to heat and hold these irons while another man did the scraping. By this old plan the cost was $30 a car for burning and scraping ready to paint, and wages then were about two-thirds what they are now.

A charcoal furnace was used in some shops, but was not practicable for car work, it being best adapted to burning off on locomotive tanks. It is still in use with good success, although steaming the body of the tank is a better and quicker method when it is convenient to apply it. Some improvement was made when the spirit-lamp was introduced, Wakeman's being the first I had any knowledge of. It did the work well, one man being able to burn and scrape; but the most serious objection to this lamp is the expense of running it, four gallons of alcohol being required to burn off a car and costing about $10, and a large part of the time was spent in re-filling the lamp, as it would run but 1½ hours.

I might mention other methods of removing cracked paint. Many have been tried and found either too slow or injurious to the fresh paint which followed their application. Caustic soda, potash, concentrated lye, ammonia, carbolic acid, lime, wood naphtha, the Benzine Paint Burner, and others of a similar nature, are almost worthless at the present time, although they may have answered the purpose when nothing better could be had. Soaking or cutting the paint with alkali or acid is not a safe method. And supposing it were safe, wherein lies the economy when the burning is much the cheapest?

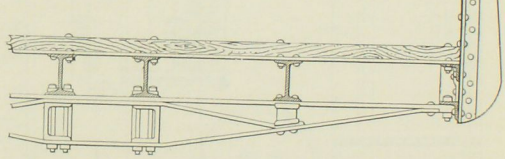
The gasoline lamp, which is not yet in general use. I have used it for four years with the best of success. The expense of removing the old paint has been reduced fully one-half. It gives a steady heat and burns freely. A lamp holding one quart will burn 2½ hours. One man can burn and scrape, and a car can be burnt off and cleaned ready for painting at an expense of $15. This method is superior to gas, the flame is stronger and the cost far less. You also have the advantage of being able to take the lamp to any part of the shop, which cannot be done conveniently with gas.

When we burn off a car body, the wood battens are generally removed and new ones put on, although we frequently burn them when they are in good shape, especially above the middle rail of the body. Care is required in scraping off the blistered paint so that no gouging or scratches be made. The surface should be scraped clean, then sand-papered well with block and No. 1 paper before applying the priming coat. Scraping-knives should be 1½ or 2 inches wide, stiff in the blade, square at the point, not sharp, but blunt: run the knife under the blistered paint, following up close to the lamp. If care is exercised, there is no need of making dents in the wood, and the heavier the body of paint on the car the better it will peel off; if the paint is very dry, give it a coat of raw oil previous to burning, allowing some time for it to soak into the paint. This will cause it to blister much easier, and it will scrape off cleaner from the wood. This lamp will burn in any position, will throw the flame wherever wanted; it can be spread in any shape; you may burn overhead on the roof projections as well as on the side. In fact, it is the most satisfactory and economical means of removing old paint that I have yet seen.

I shall have very little to advance on the methods of removing cracked or decayed varnish from the inside finish of the car. After ten or twelve years service, we find generally that the varnish is cracked more or less and requires to be removed if a good finish is desired. The best plan is by scraping the varnish off. This is the most practical way, and makes a good job if well done and sand-papered properly; but too often inexperienced men, in scraping, will leave the surface in a bad condition. This should be guarded against, and men who understand the work put to it. A better foundation will be left after scraping than when the work was first turned over to the painter from the hands of the wood finisher.

Other methods have been tried, and I have tested several. Spirits of ammonia will remove the varnish, but it requires time and repeated applications to reach the foundation; then, when it is done, you have got a rough surface which takes a large amount of labor to prepare it for varnishing, and any preparation of this nature has a tendency to destroy the richness of the natural woods. But supposing that any of the preparations offered for this purpose should not stain or injure the wood? Where has any saving been made when the varnish can be scraped off and the surface left in a good and dry condition at less labor and expense than by any other method? I am satisfied from my own experience that scraping is much to be preferred to any other plan that I know of.

FIG. 4.



KELLOGG'S IMPROVED IRON CAR.—*See page 112.*

Timber for Railroad Uses.

The moisture of the soils in the South is very destructive to woods employed as the bed for railway track, and managers have been troubled to know what is the most economical method for obviating loss resulting from this cause. Creosoting has been resorted to. Several works with large capital have been established in St. Louis for the treatment of wood by the creosote process, and in Texas the treatment has been applied along the lines as construction was pushed forward. This method, however, is considered rather too expensive. Some railway men have concluded that the ailantus and catalpa will prove to be the cheapest and most durable wood for tie and bridge timbers. One company, whose road extends chiefly over prairie lands, is having a large plantation seeded for these trees in equal proportions. Both the catalpa and ailantus are readily propagated from the seed, and bear seed-pods abundantly. Another company, whose road enters Texas, is arranging to plant several hundred acres of these trees in that State. Even the Iron Mountain Company, that probably owns more heavily timbered land than any other in the country, has contracted for the cultivation of a catalpa farm near one of its stations in Missouri. On this road are catalpa ties that were laid nearly fifteen years ago and are apparently as sound as ever. It is authenticated that in Southern Ohio, where one species of catalpa is indigenous, there are posts and timbers of this wood that have been in the ground a full century and yet show no signs of decay.

Although the ailantus is an importation from China, still it and the catalpa seem to find in soils of Missouri, Arkansas and Texas just what they require to thrive upon.

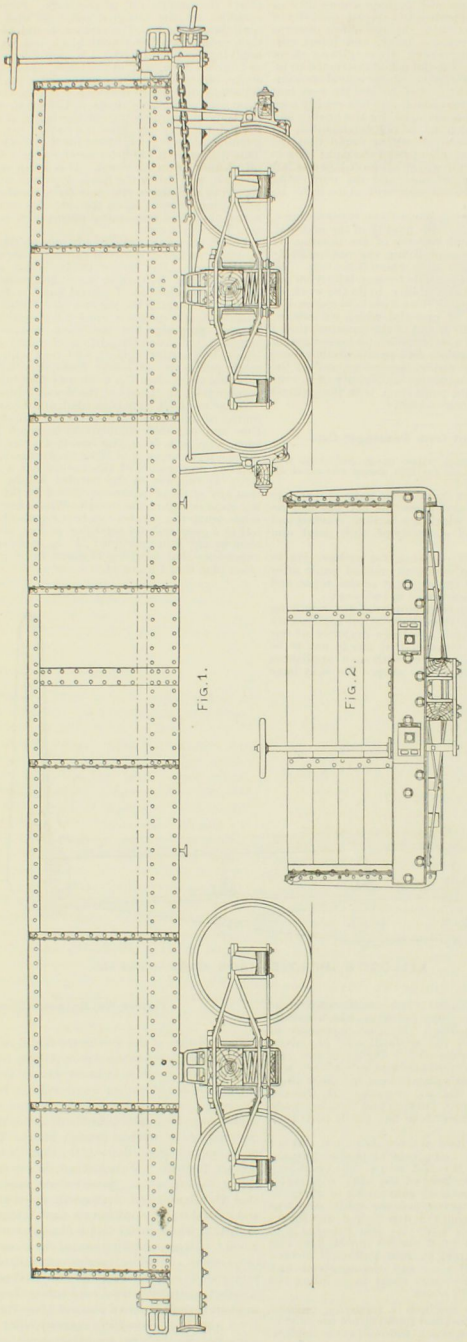


FIG. 1.

FIG. 2.

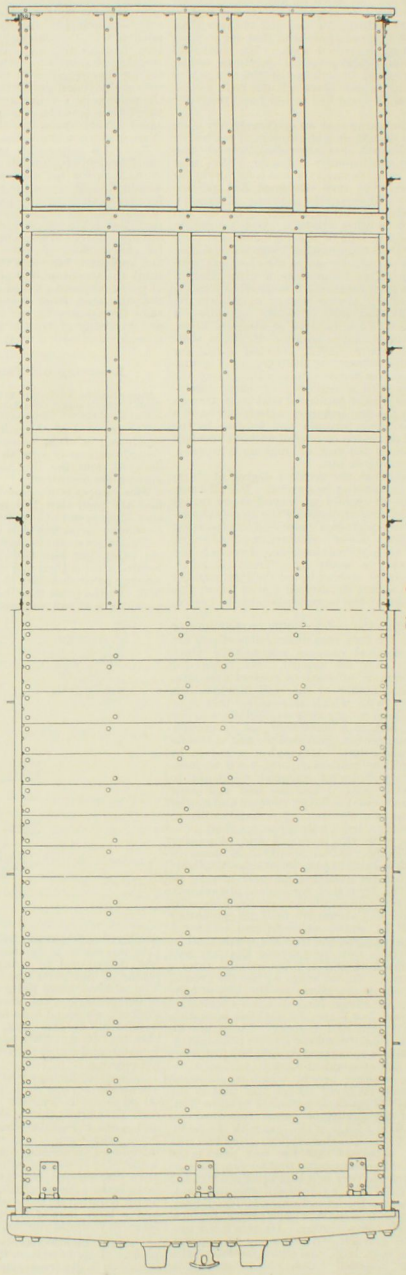
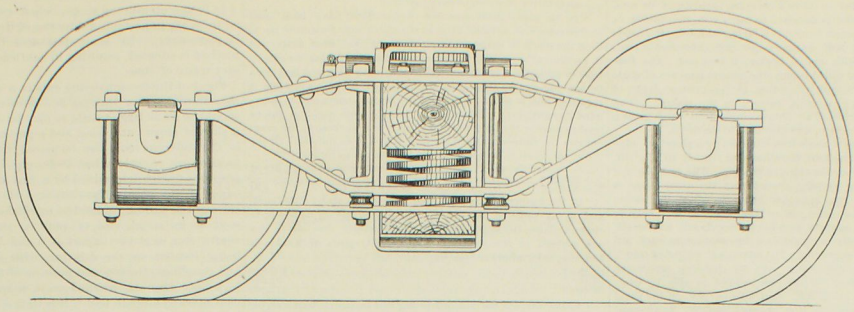


FIG. 3.

KELLOGG'S IRON FREIGHT CAR—TARE 9 TONS, CAPACITY 25 TONS.

(For description see page 114.)

Fig. 5.



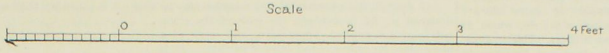


Fig. 6.

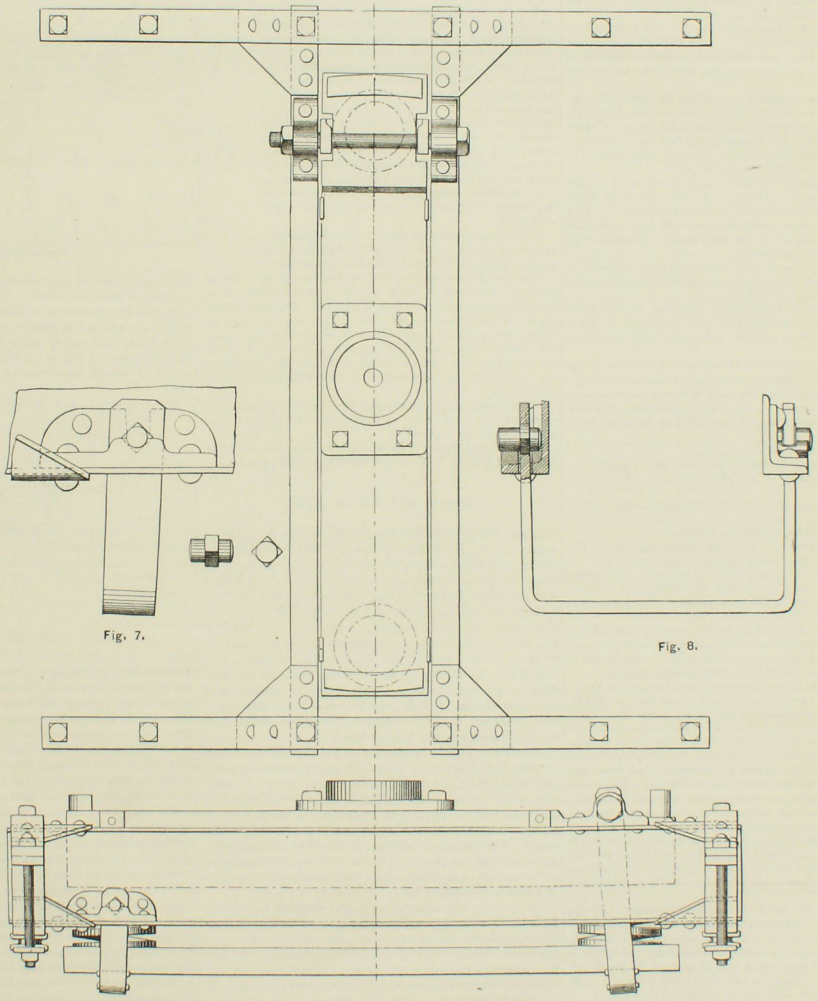


Fig. 7.

Fig. 8.

Fig. 9.
KELLOGG'S IMPROVED IRON CAR TRUCK.
(*For description see page* 114.)

Kellogg's Iron Freight Car and Car Truck.

The engravings on preceding pages represent an iron gondola car and an improved iron car truck, designed by Mr. C. H. Kellogg, of Buffalo, N. Y.

The car is intended to have a carrying capacity of 25 tons. It has drop ends, and is designed to carry coal, ore, timber or merchandise. The length over sills is 30 ft., width 8½ ft., inside height of box 3 ft., with capacity for 826 cubic feet of coal. Total weight of car with double brakes, 9 tons net. The four inside sills are of solid rolled beams; the outside ones are of angle irons riveted to No. 8. tank iron siding, giving greater depth of sill and more bearing or riveting surface to the stakes. Along the top of the box is riveted an obtuse angle iron which gives a stiffness to the construction, and also adds to the finish.

The stakes are made of angle iron stiffened by a plate on edge riveted to the projecting arm, the other arm riveted to the sill, siding, and formed over the angle at the top. The body-bolster (Fig. 4), while being slightly altered from the usual shape, is worthy of notice. The intention being to place the entire weight on the centre plates, using the side-bearings only to steady the body, it is essential that the bolster should not settle, which can be effectually accomplished by supporting each sill directly, as shown in engraving. The additional weight of iron is more than offset by dispensing with the cast-iron separators now used. Flooring is of Norway pine secured to sills by oval-headed bolts spaced as shown. End sills of oak of the usual pattern bolted through the iron channel end sill. Draw-head timbers start from and are fitted into the bolster castings receiving their bolts; along the bottom flanges of centre sills are riveted projections 1¼ in. by the full width of the sill, which fit into corresponding notches cut into these timbers. This arrangement relieves the outside bolts from all shear and tendency to enlarge the holes in the timber, being simply to hold the timbers up against the iron sills, and offering a secure attachment which may be readily replaced if necessary. Buffers may be of the pattern shown, or of any shape desired.

The following are the advantages claimed by Mr. Kellogg for a car of this construction:

1. Its durability, as if kept painted it remains unaffected by time or climate, and all repairs resulting from decay and rot will be avoided.

2. This 25-ton car, weighing but 9 tons, the proportion between the capacity and dead weight is increased from 1.9 to 2.7, equal to a reduction of nearly 36 pet cent in the amount of dead or non-paying freight. As I appreciate the fact that percentages can frequently be more easily given in theory than obtained in practice, I will give in detail the procedure.

Assume a line moving ten trains daily consisting of 45 cars each, with 20 tons, or a total tonnage of paying freight of 9,000 tons, and of dead weight (at 10½ tons each) 4,725 tons. To haul this freight in 25-ton cars, weighing 9 tons, will require 360 cars with a total dead weight of 3,240 tons, being a decrease of 90 cars and 1,485 tons of dead weight.

Or, instead of 10 trains of 45 of the modern cars, 9 trains of 40 cars (of iron), each will earn the same profit, or one train less in ten, with 1,485 tons less of dead weight.

Again, the number of wheels, burrs and other wearing parts will be proportionately reduced; less space on sidings, in yards and freight depots will be required, and fewer trains, crews and power.

As to the first cost, cars of this pattern can be furnished at the same price per ton of capacity as the best modern 20-ton car, which is the true estimate of their value, as no one would presume to obtain a 60-ton engine at the price of one of 40 tons. The cost being equal per amount of freight they will earn, the economy in their use is derived from—

1. Their increased life.
2. Decrease in number of trains to move the same freight.
3. Decrease in haulage of non-paying freight (from 2.79 to 1.9).
4. Decrease in repairs and liability to accidents due from decay of timber."

DESCRIPTION OF TRUCK.

Figs. 5 to 9 represent the details of the Kellogg Channel-Bar Truck. This truck has been in use a year, and may or may not be used with this car, at the direction of the user. The patents on the truck have been guaranteed by the Western Railroad Association not to infringe on other patents. It is described as follows:

"As wrought-iron channels are rapidly entering into use for cross-frames of freight car trucks, it becomes advisable to determine the most suitable means of connecting them with the side or diamond frames, upon which their entire stability depends.

"Channel-bar cross-frames have been in use for about 11 years, and until within two years were confined to one make or design, and gaining fair results, therefore having no competition, came largely into use. But since then two other designs have been brought forward, leaving three distinct channel trucks to select from. In these all parts may be the same, the only difference being in this one detail, the manner of connecting the cross and side frames; therefore the relative cost of each is as the proportion between each in this one detail; which, while being the only means of keeping the truck square and in shape, does not add an iota to its carrying capacity, but just the reverse. And if the result heretofore accomplished with 568 lbs. of wrought and cast-iron in one design, and 396 lbs. of cast-iron in another can be obtained with 96 lbs. of wrought-iron, the advantage is apparent. It is true that cast-iron for this purpose has largely been employed, but note at what cost.

"The most expensive design is that used exclusively by the lines operated by the Vanderbilt interests, in which two auxiliary bars 3 × ¾ in. start from the bottom of each oil-box on one side until the nearest channel is reached, thence along and bolted to the bottom flange of the channel, and from there to the oil-box on the opposite end of the same axle from which it started. Also four cast-iron brackets, each with an additional truss bolt.

"In another design, this service is performed by two cast-iron end or head pieces, but very heavy, and riveted to each channel at their ends; but not being attached to the side-frames in any shape, the stability lies entirely in the strength of the truss bolt holes, which is not excessive. In the truck represented herewith, the two frames are connected by eight wrought-iron gusset or stay plates ⅝-in. thick, through which the truss bolts pass, and riveted to each flange of the channels, arch and truss bars, making them practically one piece. As before stated, upon this one point depends the ability of the truck to retain its shape, and being liable to sudden and severe shocks, aside from the question of cost, it requires but a slight knowledge of metals to judge of the superiority of wrought over cast iron.

"To be sure, these cast-iron connections have been used exclusively and satisfactorily, as the main object seems to be to keep the truck in shape while on the track; but what shape will it present after a short journey on the ties? Also, we can all bear in mind the time when cast-iron bridges were and had been in use for years, but when wrought-iron became available it required but a slight insight on the part of engineers to determine its advantage. Again, it is possible that cast-iron can be used to answer the purpose, and it may be that those in use may; but can the railroads afford the cost, which is as follows. Of the three, the relative weight and cost per car are as follows:

On the Vanderbilt lines	568 lbs. wrought and cast-iron @3c.	= $15.23
The Thielsen	396 lbs. cast-iron @ 2c.	= 7.92
The Kellogg	96 lbs wrought-iron @ 4c.	= 3.84

"Of the former, there have been put in use about 4,000 cars; and if, as some of those using them, but having no power to change, claim, the latter will give better results, the loss to this one system, or the relative cost of 4,000 pairs of trucks, is $48,560, determined as follows:

Of the 1	$60,920
Of the 2	31,680
Of the 3	12,360

"Again, there is the cost of hauling this excessive dead weight, aggregating 27 per cent. of the entire weight.

"If desired, the ornamental name-plates may be used; it is designed to fill in between the ends of the channels to give a finished appearance, and serve as a name-plate for railroads and dates of patents. It is simply a shell, and bolted to the ends of channels. There are also two methods of suspending the swinging parts, one in the usual manner by long hangers resting on journal-boxes, riveted to top flanges of channels; and the other by short hangers (9 in. long) suspended from bearings resting on and riveted to the bottom flanges. When this is used, it is advisable to place the channel with the broad flange underneath. While this method has been approved generally, some have expressed doubts as to the ability of this flange to sustain the loads; but in addition to the strength of the metal we have also that of two rivets through the web. The pins are made from 1¼ in. square iron with ends turned down to 1⅝ in., and the hangers, having square holes, will insure the wear being confined to the journals instead of the hangers. Also, the square corners prevent the pin from leaving its place, as to remove it, it is necessary to jack up the sand plank.

"The saving in material will be easily determined, as there are no top pins, and some 7 ft. less in length of hangers, aggregating about $2.50 less in cost per car.

"This detail can be used on any channel-bar truck. The advantage to the user is this: All who have had occasion to remove the interior parts will bear in mind the difficulties attending it. After jacking up the cars, it is necessary to clamp the spring-beam and sand plank together to relieve them of the pressure from the springs, before the top pins can be relieved. With this short hanger it is only necessary to relieve the truck from the weight of the car body, and the interior work can be readily removed.

"These trucks are no experiment, but have been in successful operation under coal cars, with 33-in. sides, for nearly a year, with no outlay for repairs."

Those desiring further information are referred to Mr. C. H. Kellogg, of Buffalo, N. Y., who is the owner of the patents.

How to Melt Babbitt Metal.

L. F. Lyne in *American Machinist:* I wish to say a few words in reference to the treatment of babbitt and other similar anti-friction metals. Workmen who are unaccustomed to mixing or treating metals while in liquid state will generally melt such metal upon a blacksmith's forge by applying heat so rapidly that the ladle will become red hot before the metal within it begins to melt. When it has melted a dross rises to the surface and is skimmed off by the workmen and thrown away. The skimming process is kept up as long as the ladle is kept on the fire. Now such a course is all wrong, because, by applying heat too suddenly, the metals which fuse at lower degrees of heat sweat out, and are burned before those which melt at higher temperatures become fluid.

The dross, as it is commonly called, which rises to the surface, is in many cases the antimony or hardening property of the alloy, and should not be thrown away. The surface of the melted metal should be kept covered with fine charcoal, which will prevent oxidation. A small lump of sal-ammoniac should also be kept upon the surface of the metal. The metal should always be stirred before pouring, otherwise the heaviest metals will separate and sink to the bottom of the ladle, and a constantly varying quality of metal will be the result.

By melting the metal slowly and keeping it properly fluxed as described, it will run sharp, each casting will be found uniform throughout, and the metal be of equal hardness. In observing these simple precautions, much of the dissatisfaction now experienced in using babbitt and other anti-friction metals will disappear, and the metal not be condemned because it simply obeys the laws of nature and separates when improperly treated.

The Canton Car Co., in Canton, O., has just completed 50 box and 25 stock cars for the Cleveland, Akron & Columbus road.

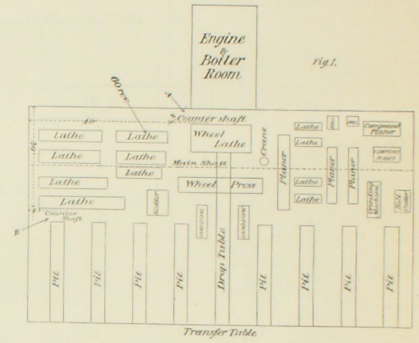
Communications.

The Fitting up of Railroad Machine Shops.

To the Editor of the National Car-Builder:

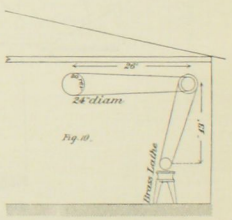
In fitting up railroad shops, when expedition and correctness are important, a drawing of the floor of the shop is necessary. In some instances the "cut-and-try" method is adopted, resulting in confusion and an unnecessary waste of time.

Fig. 1 of the accompanying cuts is a sketch illustrating the value of such a drawing as a reference. The drawing should be on as large a scale as may be convenient; and on it slips of paper cut to size, and representing the floor area of the different tools, can be placed, their convenience of location as regards other tools, etc., studied, and their positions finally determined by a line drawn around the edges on the plan. The distances of each tool from the sides of the building should be marked on the drawing, as well as its speed, size of pulleys, position of countershafts, etc., as shown in part at *A* and *B*. The main shaft being located on the drawing, with position of hangers and couplings, the size and position of the necessary pulleys may then be marked on it, as ascertained from the data marked on each tool. It is then a simple matter to build foundations for tools and locate them, with the assurance that when done no changing of pulleys, or taking



down of counter or main shafts will be necessary to effect changes or make corrections, which would be sure to be needed in the absence of a drawing. But, with the aid of a drawing, shafts and pulleys can be put in place, foundations built, and much other work done before the tools have arrived. A bill of the belting can also be made out, which it would otherwise be impossible to do beforehand.

Fig. 10 shows an end elevation, and the location from



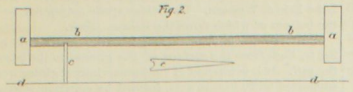
the plan (Fig. 1) of a lathe. The heights and distances being measured by a scale, the lengths of the belts can be figured. In putting up a line of shafting, a method or plan which insures correctness should be preferred, although it may occupy more time in its application than some other mode, for the reason that it is of the last importance in shop economy that all shafting should be perfectly level and in line. The following plan used by the writer will, it is believed, insure these requisites.

The location of the shaft is taken from the drawing and marked on the floor of the shop by means of a chalk-line. Other main lines are also located in a similar way. If one of these is at right angles with the main line, it is so located by means of Figs. 7, 8 or 9. In Fig. 7, if it be required to erect a shaft at right angles with the main shaft *b a c*, chalked on the floor at the point *a*, any distance, as *a b* is marked off, also *a c* equal to *a b*. From *b* and *c*, arcs intersecting at *d* are drawn with any convenient radius by means of trams or a cord. From the intersection *d*, the line *d a* is drawn, which may be extended any length and is at right angle with the line *b a c*. Or, in Fig. 8, six feet is measured off from *a*, a line is fastened at *a*, and a point eight feet from *a* on the line marked. The line is now adjusted until the eight-foot point is ten feet from *b* or the six-foot point. The line *c a* is then at right angles with *b a*. Any multiple of 6, 8 and 10, as 12, 16 and 20, or smaller proportional part, as 3, 4 and 5, will answer.

Another convenient mode is with any radius, as *d b*,

draw an arc through *b* the point at which it is desired to erect a line at right angles. Connect *a* and the center, *d*, by an extended indefinite line, and at the point this line cuts the arc, as at *c*, draw a line cutting *b*. Then *c b* will be at right angles with *a b*. Having lines on the floor of the shop representing the position of the shaft to be hung overhead, hang a plumb bob at each end of this line, marking the point where it meets the timbers overhead to

Fig 2.



which the hangers are to be bolted. In Fig. 5 this point is supposed to be at *a*. The chalk-line is now stretched under these timbers which are marked from it. Thus this line across the hanger timbers is distinctly over the line on the floor. Fig. 6 is a view from the floor of these timbers, *c c c*, a^2 *b* the chalk-line, and *a a a* the points on the hanger-beams representing the centres of the shaft. A straight-edge, *e*, is placed to cut the points *a a* on two beams, and a line, f^1 f^1 drawn by means of a square, *d d*. On this line points f^1 f^1 are located, which also locate the points at which holes for the bolts supporting the hangers are to be bored. By means of a level *e*, and straight-edge *d*, with projecting lugs, as shown, the first beam is dressed level where the feet of the hanger are to come, as shown in Fig. 5. With this first beam *g* as a guide (see Fig. 4), the next one *h* is dressed level with it by straight-edge *f* and level *e*. The beam *h* is also trued lengthwise, as was the first one, as shown in Fig. 5. Thus each beam is leveled both ways, using the last one as a guide for the next. Having trued all the hanger-beams, the hangers are bolted up to place, and a line *d d* (Fig. 2, which is a top view) stretched at a level

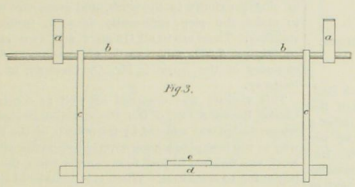


Fig 3.

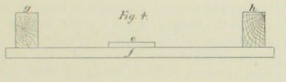


Fig 4.

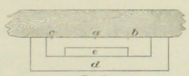


Fig 5.

with the shaft at any convenient distance from it, and parallel with the first line chalked on the floor. The first section of shaft with the pulleys belonging on it, as ascertained from the plan in Fig. 1, is hoisted into place in the hangers. A gauge-stick c (Fig. 2), is then placed on the shaft and tried with the line *d d*, and the shaft adjusted by moving the hanger, or the box, if adjustable, until it is in line with the line *d d*, *b* being the shaft; *a a* top foot of hangers, and *c* the gauge-stick. The next section of shafting is placed and aligned similarly until the whole line is in place. It now only remains to level the shaft. This is done as shown in Fig. 3. Two hooks c^1, made from one-inch pine, and both cut out at arcs, so as to insure the hook *f* for the shaft, being the same distances from *g* for the straight-edge *d* in both. It is used by placing one hook near each hanger, on the shaft *b b* placing the straight-edge *d* in place in the notch *g*, and trying the level *e*. Of course, as the beams were first leveled and the hangers will be very closely alike, the shaft will not be far out of level, which is corrected by adjustable boxes in the hanger or by raising or lowering the hanger itself.

The writer believes this plan will be of use to many readers of the CAR-BUILDER who may be called on to put up a line of shafting, and it will be found far superior to the old-fashioned plan of placing half wooden blocks in the hangers and stretching a line through them, as this plan does not allow for the sag of the line; and, as in the plan shown, the line is alone used for horizontal adjustment, and supported at frequent intervals, it cannot affect the truth of the line of shafting. The writer has put up a line of 2¼-inch shafting, 150 feet long, with all of the pulleys in place, by the plan shown, and when finished the entire line could be revolved by the force of one hand applied to the rim of a 20-inch pulley, thus proving that the shaft was in line and would run with a minimum of friction. It is advisable in all shops to test at least once in six months the truth of the shafting, as a shaft out of line will absorb a great deal of power, and the settling and springing of any building will affect the truth of the shaft. It will frequently be found, when the stationary engineer complains that for some mysterious reason the engine demands a larger consumption of coal than formerly, that the main shaft is out of line. The writer has in mind a frame shop in which, at mysterious intervals, the main shaft would heat and bind, causing trouble all around. This trouble would sometimes continue for days, and again only for hours, and suddenly disappear. It was finally noticed that the trouble always occurred in windy weather. It was then but a step to notice that the hanger-beams were supported to the peak of the roof by tie-rods, and, as the roof had considerable expanse, it was moved by the high winds, and the shafting followed the movements of the roof. Thus, after many years, the simple mystery was explained.

FRANK C. SMITH.

Construction of the Rules relating to Interchange of Freight Cars.

To the Editor of the National Car-Builder:

I submit the following inquiries in reference to cases in regard to which the revised rules governing the interchange of freight cars are silent, hoping some of your readers will be able to give the desired explanation. It is to be presumed, of course, that the men who revise these rules every year know their intent, but there are many railroad men who do not. It is for the benefit of at least one of the latter class that I ask:

1. How much should an axle be bent before being condemned, as they are usually tried over the outside of tread and flange?

2. How much should be chipped or broken from a wheel flange before the wheel can be condemned under the rules?

3. In case of defect in a car where M. C. B. card can be

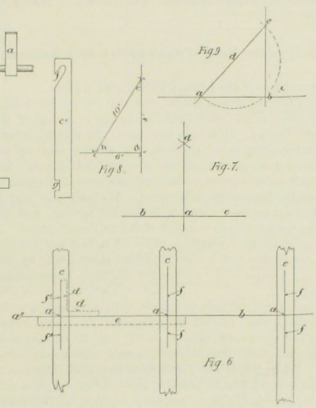


Fig 6

used, who should furnish the card, and should it be signed by the delivering or receiving inspector?

4. If a wheel has one or more spots on the tread showing chill worn thin or small sand holes in it, the tread being apparently as round as when it was new and not worn or flat, can or should such a wheel be condemned under the rules?

S. P.

Dead-Blocks.

To the Editor of the National Car-Builder:

I have read with much interest your articles on the subject of dead-blocks, or "man killers," as they are termed by some car-builders who have had no experience with them, or with handling cars in yards and trains.

Could these same car-builders occupy the position of yard-master for a week or two, and know the safety and small amount of breakage of cars with dead-blocks, as compared with cars without these attachments, they would soon ask their superior officers to have them placed on their cars. If the managers of railroads would ask their car departments to furnish a report of the expense of repairs to draw-bars and attachments, and the cost of new sills for one month, it would settle the question. They would soon find they were paying a large sum of money in trying to run their cars without dead-blocks.

I do not believe there can be found in the United States a yard-master who would object to the dead-blocks; but it is, on the contrary, surprising to them how railroad companies can afford to operate their lines without them.

I am not surprised to find that some of the car-builders propose to set the dead-blocks 20 inches from center to center, and yet they all talk about trying to have all cars duplicates of each other in all parts that need repairs. It appears to me as if each car-builder had a little hobby-horse of his own; but if they adopt 20 inches from center to center as a standard for the dead-blocks, they will find they have put the saddle on the wrong pony.

There are 219,369 cars running with dead-blocks set from 28 inches to 31 inches from center to center (and very few are less than 31 inches), as against 31,198 cars with the blocks set 20 inches from center to center. If the car-builders want uniformity, why not take this standard as a guide, and set the dead-blocks 31 inches from center to center?

PENNSYLVANIA.

[Double blocks or "man-killers" protect the car, no doubt, and prevent much breakage to draw gear. But are they the safest arrangement for the men who do the coupling? This is the paramount consideration. If the yardmen will say that the link and pin can be as safely handled with double blocks as with single, and that it is not material whether the blocks are 30 or 40 inches apart, that ought to settle the matter. They are the ones who take the risks. Let them speak out.—ED. CAR-BUILDER.]

Testing Locomotive Boilers.

To the Editor of the National Car-Builder:

A very effective and cheap method for testing locomotive boilers, either in the repairing of them or in new work, has been invented by Mr. Robert Wiggins, General Foreman of the C. C. C. & I. railroad shops, at Delaware, Ohio. The method consists in completely filling the boiler with cold water when it is over the pit. A connection is then made with the steam-heating pipes in the pit from any convenient opening in the boiler, the steam turned on, and the water in the boiler heated. When the water is sufficiently heated to approximate the condition of the boiler when in actual service, a small force pump is connected with the boiler, and as the latter is already full of water, a few strokes of the pump, drawing water from a bucket, runs the pressure up to any desired height. The whole arrangement is so inexpensive and so effective that it has been adopted at the other shops of the road.

V-HOOK.

The Management of Car Journal Boxes.

To the Editor of the National Car-Builder:

At the last meeting of the Car-Builders' Association a good deal was said about hot journals, and, as usual, there was some diversity of opinion as to the specific causes and the proper means to be used to prevent the difficulty and avoid the delays and other inconveniences arising therefrom.

In former days a frequent cause of the heating of car journals was the imperfect fitting of the brasses. The Hopkins' lead-lined bearings had not then been invented, but we have them now, and wherever they are used there is little or no heating from this cause. But there are other causes besides ill-fitting brasses. A cracked or bent axle will cause a journal to heat. A dust-guard that is too much worn will let sand and dust into the journal box and lodge it where it will cause heating. The trouble is often occasioned by ignorance or neglect on the part of the greaser, or he may have too short a time allowed him before the train is in motion, compelling him to go from box to box with great rapidity, skipping now and then one, under the impression that nobody will be likely to discover the omission. Insufficient, as well as too much packing will cause heating, because in the one case the waste does not reach the journal, and in the other it is crammed so hard that the oil cannot penetrate it. Inexperienced persons are frequently sent to do the oiling in the absence of the regular greaser, and in such cases the work is almost always imperfectly done.

As I have had considerable experience in this matter, allow me to make a few suggestions which may possibly be of service to some of your readers. Suppose we have a loaded freight car or a heavy passenger car, the brasses of which are worn out and require to be replaced by new ones. The first thing to be done is to see that the axle box is fairly seated over the journal, so that the old bearing can be easily taken out and the new one put in. It should also be ascertained whether the two boxes on the same axle are the same distance from their respective wheels. Should there be any difference, drive an iron-shod wedge between the back of the box and hub until the desired position is obtained, then rake out the old packing, place a short jackscrew under the front of the box and lift until the journal-bearing key and bearing can be taken out. When the new bearing and key are placed on the journal, lower the screw and commence repacking the box. Have the waste, whether wool or cotton, well saturated with oil, but not so much so as to drip, or the packing will be too soft; then with the packing-iron force the first handful or two of the waste well to the back of the box, and bung up all openings that may be left by a worn or badly-fitting dust-guard. Fill in well on the sides and underneath the journal, and also in front. Lastly, place a handful of half-dry waste in the opening or doorway of the box a little away from the end of the axle, and pour in as much oil as will stay in the box. Place a pail or lay some dry waste underneath, to catch the oil that is pretty sure to escape at the back end.

When re-oiling put in more waste if there is room for it, and always bring the packing-iron under the axle and work the waste so as to make it spongy. When by repeated refilling it gets so hard that the packing-iron cannot easily be brought under the axle, it will be time to pull out the old waste and soak it in oil preparatory to re-

packing. Bits of metal that have been broken from the brasses or keys, should never be left in the box lest they might in some way work mischief.

What I have said is not intended for those who fully understand the points to which I have called attention, but rather for those who have had but a limited experience in the management of car journals, and who may at any time be sent to put in new brasses to enable cars to proceed on their journey. C. A. L.

The Montgomery Palace Stock Cars.

The practicability of transporting cattle at high speed from Chicago to New York, was demonstrated about a month ago by the Montgomery Palace Stock Car Co. The train consisted of 20 of the company's cattle cars carrying an average of 18 cattle to each car. A Pullman hotel car was also attached to the train for the accommodation of a number of gentlemen who were invited to witness the experiment. The route was over the Grand Trunk and New York, Lake Erie & Western roads, the train arriving at Jersey City in about 53 hours, and making an average speed of 19 miles an hour, including stops. The cattle on being discharged were found to be in good condition. None of them were injured during the trip, and upon weighing the cargo it was found that the average loss in weight was only 24 pounds per head. The average weight per car before starting from Chicago was 20,946 pounds, and the average time occupied in loading was from three to five minutes per car.

The cars are 38 ft. 7 in. long and 9 ft. wide, outside measurement. The inside length is 36 ft., and the height 7 ft. 6 in. The interior is divided into compartments by flexibled partitions, each compartment holding four or five cattle. These partitions are in the form of gates which can be swung from the sides of the car either way. They are made of a combination of slats and steel bands, with a broad rubber band running across the bottom near the floor, so that the animals when lying down can put their legs under the doors without risk of injury. These partitions can be detached and packed under the roof so as to make room for other freight on return trips. On the roof of each car are two oblong boxes in corners diagonally opposite each other, running parallel with the length of the car to its center. These boxes are filled with feed for the cattle. Under these boxes at a convenient height are arranged revolving troughs made of tin. When in use they are turned up, otherwise they are secured so as to prevent dirt from accumulating in them. By means of these troughs the live stock is fed and watered. In the bottom of each box is a large iron valve that is operated by means of a lever placed at the end of the car. A sufficient quantity of feed having been placed in the box the valve is turned and the food drops down into the troughs, which in the meantime have been turned up to receive it. Along the top of the interior of each car runs a 3-inch pipe, which is connected with the pipe in the next car by means of rubber hose. From the main pipe smaller ones run down the side and connect with a horizontal pipe running over the top to the troughs. This horizontal pipe is perforated. When it becomes necessary to water the cattle, the train is stopped, connection is made with a pump and in a few seconds the troughs are filled. The cars run on Chisholm suspension trucks, and have Westinghouse air-brakes and Janney couplers.

It is said that the above-named company have purchased all the more valuable stock car patents, and consequently control all the essential principles involved. By combining these with other improvements, they have devised a car which combines as far as possible all the merits and avoids the defects of previous constructions. The company design building, equipping and owning its own cars, and operating on a similar basis to that of the Pullman Palace Car Company. It will furnish its own conductors and make a charge of a fixed price per head to shippers and of mileage to the railway companies.

America's Famous Bridges.

On the 8th of March, 1855, the locomotive passed over the celebrated Niagara Suspension Bridge for the first time. It was looked upon as a wonderful work, and thousands visited it from all parts of the civilized world. It is about 800 feet in length between the towers, and hangs suspended in mid air 258 feet above the water. Its four great cables are each 9¼ inches in diameter and composed of 8,000 wires. The towers over which they pass are 15 feet square at the base, and 66 feet in height. The cost of the entire structure was $500,000.

The first cast-iron bridge of any note in the United States was the celebrated iron bridge of Philadelphia, completed in July, 1856, at a cost of $500,000. It is 390 feet long, 42 feet wide, 40 feet above the surface of the water, and weighs 1,200 tons. Five years were required in its construction.

The Starrucca Viaduct, on the line of the Erie Railway, near Lanesboro', Susquehanna County, Pennsylvania, is one of the most grand and imposing structures of the kind in America. It is a splendid piece of masonry, 1,200 feet long, 110 feet high and 30 feet wide, consisting of 18 arches, with spans of 50 feet, and strong piers that will probably stand while time endures. Its cost was $320,000.

The great suspension bridge across the Ohio River at Cincinnati may justly be classed among the grandest achievements of the age. Its length is 2,252 feet, and the roadway is 100 feet above the water. Its towers are each 86 × 52 feet at the base, 230 feet in height and 1,057 feet apart. The work was commenced on the 1st of September, 1850, and was about 11 years in the course of construction, and cost about $2,000,000.

The Victoria Tubular Bridge, across the St. Lawrence, at Montreal, Canada, is another grand specimen of engineering skill. It consists of an enormous iron tube, 22 feet high, 16 feet wide and 9,194 feet long. It is supported by 24 stone piers and two solid abutments. It was opened for travel in 1860 and cost $6,300,000. The bridge across the Ohio River at Louisville is 5,219 feet long and is supported by 24 stone piers. Its cost was $2,016,819.

The celebrated St. Louis Bridge was commenced in 1869 and completed in 1874. The main part is 1,520 feet in length, divided into three spans, resting on piers of limestone and granite. The piers were sunk to the bed rock in the river, through the sand from 90 to 100 feet, by means of wrought-iron caissons and atmospheric pressures. The immense spans are each formed of four huge cast-steel ribbed arches. The bridge is two stories in height, the lower story being used by the railway and the upper by street cars, carriages and footmen. Beyond the spans it passes over a viaduct approaching 200 feet in length, when the railway enters a tunnel 4,800 feet long, passing under a great part of the city. The entire cost of the bridge and tunnel was over $10,000,000.

The crowning bridge structure of the American continent, however, is the famous East River Bridge, now nearly completed. The length of the main span is 1,595 feet. The height of the towers above high water mark is 276 feet, and the height of the roadway in the center above the water is 135 feet. The four cables are each 3,578 feet in length and 15¾ inches in diameter. The entire bridge, including the approaches on each side of the river, is 8,172 feet long. Its construction began in January, 1870 and its probable cost when completed will not be less than $16,000,000.

A Ride on the Mount Pisgah Switch-Back Railroad.

A traveler over the Lehigh Valley road writes:

Of the famous Mount Pisgah and the Switch-Back Railroad we can do no better than to use the language of the Tourist's Guide. By taking the stage, the tourist, after a most interesting drive through the village and up the mountain side, arrives at the Switch-Back depot. Immediately on the brow of the hill we find the starting-point of the Switch-Back Railroad. We take our seat in the pleasant summer cars, the brakes are sprung, and the cars run by gravity to the foot of Mount Pisgah plane. In looking up at this formidable place of ascent for the first time, the visitor feels somewhat timid about going up, but there is no cause whatever for the slightest apprehension of danger.

The plane is 2,322 feet in length, with an elevation of 664 feet, being a rise of about one foot in three. There are two tracks and upon each runs a safety car, to which are attached two heavy Swedish iron bands, each one 7½ inches wide. These bands are fastened to iron drums, 28 feet in diameter, in the engine house at the head of the plane; the motive power being two stationary engines of 120 horse-power each, while the steam is generated in ten boilers which measure 2½x30 feet.

The safety car has attached to it an iron arm, which extends from the side of the Barney or safety car, over a ratchet rail between two tracks; should the band break, or any accident happen to the machinery, the least backward movement causes the arm to drop into the notches of the safety rail, holding the train stationary. In all the years that this enterprise has been in operation not a single passenger has met with accident in going up this mountain.

The signal is given to the engineer at the head of the plane. The safety car is drawn slowly from the pit behind the car, and the train begins to ascend until we arrive at the top, nearly 900 feet above our starting-point.

We have now reached the summit of Mount Pisgah, and attained an elevation of 1,500 feet above tide water.

Passing through the engine-house, and slowly over a trestle spanning a wild ravine, to the right and north you see Broad Mountain, and in a ravine some two miles distant, half way between the summit and river, can be seen Glen Onoko, a piece of nature's handiwork, well worthy of a visit.

We now run by force of gravitation only, and two miles from Pisgah pass the old tunnel and deserted hamlet of Hackelbernie. This tunnel was opened by Josiah White, as an outlet for the Nesquehoming Valley coal, but, becoming almost filled with water, was abandoned.

The fall of the grade to the next plane (6½ miles from Pisgah), is 47.3 feet to the mile. Four miles from Hackelbernie we find Bloomingdale Valley and the plane of Mount Jefferson. No halt is made longer than the time required to place the safety car in position, when we again ascend by means of machinery, similar to that employed at Mount Pisgah. This plane is 2,070 feet in length, and has an elevation of 464 feet. Again we see the earth seeming to recede from us, and again after reaching the summit (1,660 feet above tide water), drawn by invisible chargers we hurry along over a mile descent of 45 feet, to the quaint mining village of Summit Hill.

From Summit Hill back to Mauch Chunk is a very exciting run, being all down grade a distance of nine miles.

The Kinzua Viaduct.

The highest railroad bridge in the world is just finished on the extension of the Bradford branch of the New York, Lake Erie & Western. The bridge spans a deep ravine, at the bottom of which flows the Kinzua creek.

The structure is 2,052 ft. long between abutments and 302 ft. high from the surface of the ground to the base of the rail. It is composed of continuous lateral girder irons, supported on 20 iron towers, formed by columns strongly connected together by bracing so as give the greatest amount of strength and stability to resist pressure from wind and storms. These towers have a uniform length at top and bottom of 38 ft. 6 in., a width at top of 10 ft., and at the bottom the width varies with the height, the two highest towers having a width at their bases of 102 ft. 9 in., the width of the towers at their bases being uniformly one-third of their height from the top of the masonry on which they rest to the underside of the girders of which the truss is composed.

There are 20 clear spans of 61 and one of 62 feet in length. Due provision is made for expansion and contraction in the girders of the truss on the plates connecting the columns at the base of the towers and to the masonry. The towers are firmly anchored to the masonry piers by heavy iron rods. The floor system of the viaduct, which is 20 ft. in width, consists of oak ties 8 in. in width and 12 in. deep, laid on the girders 8 in. apart, on which the rails rest. Every provision is made for safety by double timber guard-rails. On each side, outside the guard-rails, a side-walk is laid and protected by a hand-railing.

The weight of iron in the structure is 4,200,000 pounds. The masonry is all of a very substantial character, of a good quality of sandstone, which was fortunately found in close proximity to the work, and great care was taken to make the pier sufficiently large to insure perfect stability. There are in all 112 piers and two abutments, containing 7,000 cubic yards of masonry. The chief engineer of the work is Mr. O. Chanute, of the Erie Railway.

This viaduct was designed as well as constructed by Clarke, Reeves & Co., of the Phœnixville Bridge Works, whose design was selected by the officers of the Erie Railway as the best plan among several competing plans. The work was finished in just four months from the time of beginning to erect iron. When it is considered that there are 19 towers, 6 of which are higher than those of Brooklyn bridge, and that the viaduct is as long as from the City Hall to the Battery, this is a rapid feat of construction, and due entirely to American methods, no scaffolding of any description having been used. The work of erection was managed by R. A. Simmons, Superintendent.—*New York Graphic.*

Electric Light on Railroad Cars.

The Philadelphia *North American* of September 20 says: "The first railroad car that has been illuminated with electricity in this country arrived at the Broad street station last evening, where it immediately became an attraction for railroad officials, electricians and others. At the solicitation of one of the companies operating Edison's electric lights, the Pennsylvania Railroad Company granted permission to them to supply one of its cars with the necessary apparatus for lighting it by electricity, and for some time past the work has been going on at Jersey City, under the management of Dr. Dudley. The lights are incandescent, and are of eight-candle power. A Faure storage battery is used, and it is stated that all the fixtures, of which the batteries, Edison's electric dynamo and Faure's electric accumulator constitute the greater part of the weight, add about 1,200 pounds to the weight of the car. The lights are arranged in pairs at the center and ends of the car, giving sufficient light for reading well, and are not in the least influenced to flicker by puffs of wind. As it is well known, the light is less tiresome to the eyes than gaslight, and one can look at them without being blinded. It is understood that upon this practical test of the efficiency and expense of electric lighting will depend its permanent use by the company. A number of the company's employés, and those interested in the practical success of electricity as an illuminator, took a short excursion out as far as Paoli last evening for the purpose of examining the lights, and probably for the sake of riding in a car which, if electricity were not now so common, would be considered as great a wonder as the first locomotive."

THE following composition for the lubrication of railway axles has been patented in England: Place four parts tallow, two parts water and two parts soda in a vessel; then apply heat, and agitate or stir the contents of such vessel until thoroughly melted and brought to the boiling point; then pour the liquid into another vessel, and keep the same agitated therein until quite cool. A lubricant or composition is thus produced which is especially suitable for lubricating railway axles and other bearings.

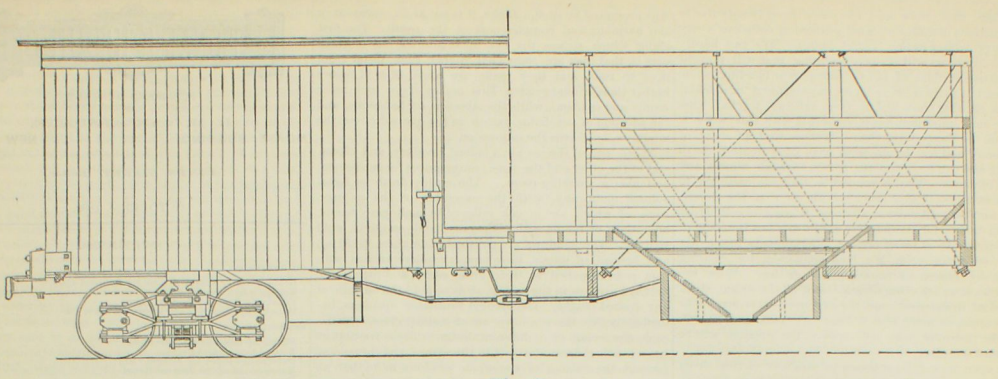


Fig. 1.

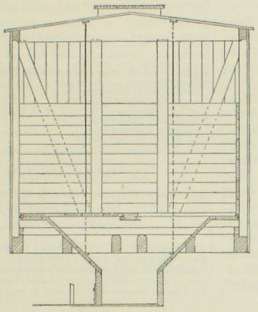


Fig. 3.

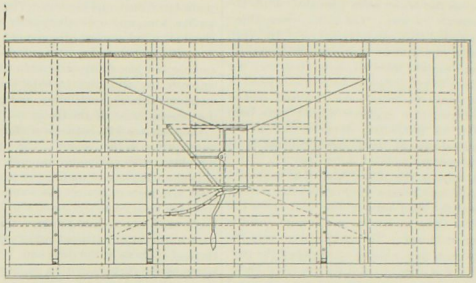


Fig. 2.

WILSON'S COMBINATION AND IMPROVED GRAIN CAR.

We printed in our last issue a brief description of this car. The peculiarities of its construction are shown in the engravings we now give. The car is 34 ft. long by 8 ft. 6 in. wide over sills. Its height from bottom of sills to top of plate is 7 ft. 6 in., and from floor to plate 6 ft. The side and end sills are 8 × 5 in., the center and intermediates 8 × 4½ in., and cross timbers 5 × 2 and 5 × 3 in. Width of doors 5 ft.

Fig. 1 is a side elevation and longitudinal section, showing framing, trussing and size and position of hoppers, of which there are two, one over each truck, or nearly so.

Fig. 2 is a half plan showing position of flaps and grain door, one side with the flap down and the other with the flap and door up; also the mechanical arrangement for discharging grain or coal in bulk from the hoppers and car body.

Fig. 3 is a cross section through hopper, one of the flaps or covers being down and the other open; also the position of longitudinal plank over skeleton floor, which makes a tight joint and prevents leakage. The supports on which the flaps rest when shut down are also shown.

The advantages claimed in behalf of this kind of construction over that of the ordinary grain car are as follows: A more rigid frame is secured, with a capacity for carrying a 30-ton load; a larger proportion of the load is carried nearer the trucks, thus relieving the center of car from undue strain; the hopper frames being bolted to the main framing of the car, prevent the trucks from slewing round in case they get off the track, more effectively than by check-chains; the skeleton frame over hoppers is bolted to the main framing and body transoms, and adds to the strength of the car in carrying the increased load. The trucks have 600-pound wheels, and steel axles of the M. C. B. standard dimensions. Concave elliptic springs are used, which are said to contain one-third less steel than the flat leaf elliptics of the same capacity. The sample car has run 16,000 miles without material wear and tear.

Mr. Wilson says the cars he will build in future will not average more than 26,000 pounds in weight, and will carry 60,000 pounds of load, and that 30 of them with their loads can be hauled as easily as 40 cars carrying loads of 40,000 pounds each, the comparative result being $30 \times 30 = 900$ tons, and $40 \times 20 = 800$ tons, making a difference of 100 tons paying load per train in favor of the improved combination car. He also claims that in these trains of 30 and 40 tons respectively, there is a difference of 16,000 pounds tare or dead weight, the train of his cars being that much less than a train of 20-ton cars, besides dispensing with ten pairs of trucks and shortening the length of trains. The cost of the car is estimated to be about $100 more than that of an ordinary 20-ton box car.

The above is condensed from the detailed estimates furnished, showing the superior economy of this car in its practical running. It is hardly necessary, however, to figure up the saving by going into details. Given the cost, weight, and the load it can carry year in and year out, without the necessity for anything more than ordinary repairs, and every railroad man can figure up the saving economy for himself very quickly—in fact it will almost figure itself up.

Further particulars can be obtained by applying to Thomas L. Wilson, Port Hope, Canada, or to C. Dinsmore, Room 51, Coal and Iron Exchange, Cortlandt street, New York.

Railway Improvements Needed.

American railway practice has changed in many particulars since the last decade, and one of the results is that certain classes of accidents are more frequent than formerly. Some of these, as has been before mentioned in these columns, are the result of higher velocities and heavier trains. The increased weight of locomotives and train loads, with 20 and even 30 tons of paying load to the car, will scarcely call for any new inventions. All that is required on that account is stronger bridges and permanent way and fixtures.

But the higher velocities increase the number of collisions, and here is work for the inventor. The number of collisions of passenger trains have not increased in proportion to the increase in speed, for the reason that atmospheric and other brakes were opportunely invented; but as these brakes were not adapted to freight cars, collisions between freight and passenger and freight trains are on the increase.

The "butting" collisions average about twelve per month. Some of these are caused by bad management or disobedience of orders, and some by reason of the trains not being under control of the train men. This latter evil can be remedied by the use of a new style of brake, or perhaps the improvement of some that are now in use. "Rear" collisions are at the rate of 25 to 40 per month, and from five to seven of these are caused by trains breaking in two, and the detached cars being in the way of trains following closely. These accidents may be prevented by safety couplings when they are brought out. The remaining portions of these collisions, or many of them, may be avoided by obedience to orders and a better system of signals than is now in general use. We also have from one to three crossing collisions per month. The only sure way to prevent these disasters is for all trains to stop within, say, 100 feet of the crossing, but as this rule will not be established or enforced on all roads, inventors are called upon to produce an effective signal for crossings.

Then we have from derailments 65 to 80 monthly. Many of these are caused by defect or failure of track or equipment, but from 16 to 30 of these accidents are unexplained, that is, no cause can be assigned. Many of these derailments are of a serious nature, by reason of the locomotive and cars being upset, and here is where the inventor is wanted.

It is not expected that anything will be produced that will prevent wheels occasionally leaving the track, but something can be contrived that will act as a guard to prevent trucks straying down embankments and overturning.

The check chains in common use are a partial protection, but they are either too light to stand the shock, and break, or pull out their fastenings. It would seem that a kind of shoe or runner might be so arranged that, when the wheels drop from the rail, the runner would catch the rail and keep the wheels in line and close to the rail, and also act as a break by friction on the rails, thereby preventing serious accidents. Something of the kind was brought out years ago, but it was poorly contrived and did not come into use. This is a matter well worth the attention of inventors.

Another class of accidents that is becoming quite frequent is runaway locomotives. In May, of this year, three collisions and one derailment were caused by runaways. A locomotive is standing on the track with steam up and no one aboard of her. Some car or engine collides with her and gives her a slight shock which opens the throttle, and away she goes, destroying life and property. Of course there are thumb screws and other devices for securing throttles, but they are neglected, and the results are frequently serious. What is wanted is an automatic locking arrangement that will secure the throttle when closed, and at the same time not interfere with rapid handling when doing yard work or switching.

Accidents from brake beams falling on the track are becoming quite frequent, and an improvement in the manner of hanging brakes is in order. Several accidents occur every month, except in the winter, caused by cattle on the track, the barbed wire fence being an insufficient barrier to keep them off. We want an improved pilot, one that will throw live stock to one side, and not roll them under the wheels, and the trains in the ditch.

In these sweltering days it may be refreshing to consider

the fact that snow and ice cause from twenty-five to forty serious derailments and numerous collisions every ordinary winter in the United States. We can hardly expect inventors will produce anything that will prevent collisions in time of snow blockades or blinding snow storms, but there is yet room for improvement in machinery for clearing snow and ice from railway tracks. One of the most important items connected with this work is keeping the flange-ways clear. If these are kept clear of hard snow and ice, locomotives have good footing (so to speak), and can force the big plows through almost any depth of snow. What is wanted is scrapers attached to the front of locomotive truck wheels, so that the flange-ways may be kept clear at all times. It is not forgotten that several devices for the purpose are in use, but the best of them are far from being perfect. Derailments frequently occur on roads using the best appliances for clearing tracks by reason of packed snow or ice. Even the monster plows are often derailed, and all the rolling stock behind it. In severe winters the expense of clearing tracks is enormous, as much of it is done with pick and shovel, and the inventor who will reduce the expense will be rewarded therefor.

The open draw still continues to swallow victims from time to time, notwithstanding all that has been done to prevent these horrors. Within the last nine years 28 of these accidents have been reported by the *Railroad Gazette*, and in some instances the draws were provided with the most approved signals in use. Let us have something better—an audible signal that can be relied on. In April last a freight train ran into an open draw at Peekskill, N. Y. The usual signals were displayed, but were not noticed. Had there been gongs or torpedoes placed at intervals along the track, the outer one a thousand feet or more from the draw, the engineer would have been forcibly reminded of his immediate dangers, and a few dollars' worth of signals would have saved thousands of dollars' worth of property.

An occurrence similar to the above was what happened to the pay-train on the Chicago & Northwestern road, which went through the open draw of the bridge over the North Branch of the Chicago River, in Chicago, on the morning of December 21 last. The engine went into the river, but the draw was just closing and stopped the pay-car. The conductor was drowned and the engineer badly hurt. The usual signal was displayed, but was obscured by fog and smoke. Instances are not wanting to prove that no system of signals trusting to vision alone is safe.

Even when they are not obscured by smoke or fog, and are plainly visible, engineers are liable to get confused and mistake the danger for the safety signal, as has happened on many occasions. An automatic audible signal should be placed far enough from the draw to give ample time to stop, and one placed at intervals up to the draw, for the reason that the draw might be opened after the train passed the distant signal which was at safety and gave no warning of danger. It is hardly worth while to mention the fact that we have an average of seventeen locomotive boiler explosions per annum, for inventors can do but little to prevent this class of accidents under the reckless management the boilers too often receive. Similar remarks will apply to the 44 failures of bridges and trestles that occurred in 1881. However, if inventors cannot prevent all of these accidents, if they can diminish their number by some improved method of strengthening boilers and bridges they will be deserving of both thanks and liberal compensation.—*Scientific American.*

New Passenger Cars of the New York, New Haven & Hartford Railroad.

The New Haven shops of this road are making good progress in the construction of 75 new passenger cars, which will be a much needed addition to the former equipment. A number of them are already completed and running, and when those that are now under way, and for which the material is in readiness, are finished, about two-thirds of the whole number will have been completed. The bodies are of different lengths, some of them being 50 and some 56 feet long, with 16 and 18 windows on a side, and seating 57 and 65 passengers respectively. The cars run on 4-wheel trucks with 33-inch Washburn steel wheels, and have Miller platforms and couplers and automatic air brakes. The outside is painted olive green, with a brilliant varnish, and is free from the fantastic decoration so much in vogue in times past in the exterior finish of cars. This is an indication of better taste on the part of builders, and it is no doubt appreciated by the traveling public, who are also improving in this respect.

The inside arrangement and finish are deserving of particular notice, as they embrace a number of new features that are a manifest improvement upon prevailing practice, a new departure in fact, which does away with the showy, fanciful, doll-baby style of ornamentation by substituting something more in keeping with the uses of the structure, and at the same time richer, plainer and better—a style of finish which impresses one with its appropriateness and beauty. Where there is such an unlimited scope for the indulgence of fanciful conceits and vagaries, it is no small merit to hit upon such an arrangement and choice of material as will suggest no straining after effect or attempt at mere display; or, if the designer was prompted by such a desire, it is not at all apparent in the harmony and completeness of the result. The first thing which strikes the eye upon entering one of these cars is, that they are somewhat higher than usual from floor to roof, and they really are some 10 or 11 inches higher than ordinary cars. This makes them look more roomy and spacious, while the absence of hat-racks, and the addition of ventilator sashes in the car side over the windows, heightens the impression.

At one end of the car are a ladies' lavatory and closet, and at the other end the same conveniences for gentlemen, and also a smoking-room. The entire finish is light-colored mahogany, with the exception of the ceilings, some of which are of oak relieved by mahogany bands, and others of maple with mahogany bands and light gold striping. The windows are polished plate glass, 22x32 in., and, instead of blinds, have tapestry roller-curtains with iron rods attached to their lower edges, and fitting into notched grooves in the casing, so as to hold the curtain at any desired height. The pivoted ventilator openings, immediately over the windows, are of stained glass, 6x18 in., each one being of a different design. These ventilators have weather-strips attached to the sashes, and, of course, prevent the raising of the main windows more than an inch or two. This may be considered a defect by some, but the large clear glass is no obstruction to the view, and keeps out, when the windows are closed, a great quantity of dust and cinders. The clear-story ventilators are 5½x24 in., and open alternately in opposite directions. The door windows are ornamented cut glass. In place of the ordinary hat-racks, a pair of metal rings for umbrellas are inserted just above each main window, and also a hook between the windows to hang things on. This does not interfere with the ventilators, and gives a better effect to the general finish of the frieze.

The seats are 3 ft. between centers, and have Hale & Kilburn springs in the backs. The upholstery is light crimson plush, with golden-bronze embossed plush on outside of backs. A piece of mahogany is inserted into the nickel-plate arm rests to protect the hand and arm of the sitter from the disagreeable contact with the hard metal. The backs are hung so as to preserve the advantage of a wide back to the sitter, without being so low as to interfere with the feet of those in the next seat. The backs have metal straps at the corners, with a mahogany molding along the top. All the metal trimmings are gold bronze, including the lamps, which are of a new pattern. There are four of these with two burners each, which secures a good distribution of light.

Some of these cars have pivoted arm-chairs instead of the ordinary seats, and, so far as we can form an opinion from a short sitting in one of them, they are decidedly the best adapted to promote the comfort of the occupant of any that we have ever seen. To describe the chair in brief, it may be said to fit all round. The seat is wide and deep and not too high, the back fits the human anatomy to perfection, the sitter's neck and head are supported by a roll at the top, and there are no ugly angular points about the wood-work. The chair is upholstered in red plush and has plush arm-rests.

The axles have 3¾ by 6-in. journals. The method of heating has not yet been decided on.

We shall illustrate in a future number of the CAR-BUILDER some of the features of the inside finish of these cars, which will give a better idea of it than can be derived from a description.

MR. SAMUEL J. HAYES, Superintendent of Machinery of the Illinois Central Railroad, died in Chicago, Sept. 21. His health had been falling for some time, and with the hope of recuperating he recently undertook a trip to Colorado. At Kansas City he was taken with hemorrhage and was obliged to return to Chicago. He was 66 years of age, and has been for many years a prominent member of the Master Mechanics' and Car-Builders' Associations. His capacity as a railroad mechanic was of the first order, and peculiarly fitted him for the responsible position he has filled so long and so well. His valuable counsel and admirable personal qualities will be greatly missed in railroad circles, and by every one who enjoyed the pleasure of his acquaintance.

THE Rhode Island Locomotive Works are shipping several passenger engines to the Chicago & Grand Trunk road, with 18 by 23-in. cylinders, and 6 ft. drivers. These engines weigh 100,000 lbs., 65,800 lbs. on drivers, and have straight-top boiler to carry 160 lbs. pressure; barrel 54 in. in diameter inside at smoke-box end. They have 200 tubes 12 ft. long. The fire-boxes are 6 ft. 6 in. long and have no crown-bars, being stayed with radial stay-bolts. The outside shell is of ½-in. iron. The engines have the extended smoke-box which is now coming into such general use. They are furnished with the Westinghouse automatic and driver brakes. The engine and tender trucks of these engines have Krupp wrought-iron wheels with steel tires, the tires being fastened with Mansell's patent clip. The engine truck wheels are 37 in. in diameter and the tender wheels 43 in. The engines have one No. 8 and one No. 9 Friedman non-lifting injector, and have no pumps. The valves are the Richardson patent balance valve. The tenders will carry 3,600 gallons of water and eight tons of coal.—*R.R. Gazette.*

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.*

SUBSCRIPTIONS *to the* CAR-BUILDER *will be received, and copies kept for sale, at the following places:*

A. WILLIAMS & CO., 283 *Washington St., Boston, Mass.*
L. SCHAFFNER, *Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.*
WILLIE H. GRAY, 306 *Olive Street, St. Louis, Mo.*
ROBERT CLARKE & CO., 65 *West Fourth Street, Cincinnati, Ohio.*

THE NIAGARA MEETING OF THE CAR-BUILDERS' ASSOCIATION.

The most important business to be transacted at Niagara is the completion of the organization of the Association on the proposed representative basis. The principal officers of a large number of railway companies have already expressed their decided approval of the plan, and are virtually pledged to send duly accredited delegates to the meeting, who are to be enrolled as regular members. Hitherto, the Association, in what it has said and done, has acted under no very great weight of responsibility, and with scarcely any recognition among high railway officials as an effective working power within its sphere. In future all this is to be changed. Whatever measures and recommendations may be made with reference to car construction will be determined by votes which represent not only the power which delegates the authority to vote, but the respective interests of the road companies according to the number of cars owned by each. There will be a proper responsibility for whatever is done, and this will not rest altogether upon the Association, as such, but a good portion of it will rightly devolve upon the power represented by the membership. This puts a new face upon things, and means business. It will give a new tone to the discussions, and excite a livelier interest in whatever is done or proposed to be done. Heretofore a great deal of time has been spent in going over the same ground, making the same reports, asking the same questions and receiving the same replies. In the future action of the Association it will hardly be necessary to waste much time in ascertaining the particulars of what is already known in a general way with respect to the number of the different patterns of journal brasses, brake shoes, draw-bars, buffer blocks, and such like statistics, that are as familiar to everybody as the alphabet. No additional investigation in this line will make the facts more impressive or easier to deal with. The

number of freight cars in the country is known to be very large and constantly increasing. It is also known approximately how fast they are wearing out, and the average amount of new construction that will be necessary to make good the loss, and meet the demands of a growing traffic.

What is wanted is the necessary co-operation of road managers, who are the sources of power, in deciding upon the most effective means of doing away with the existing diversity in general construction as far as practicable, and especially in those minor details which can be reduced to substantial uniformity in no other way than by concerted and systematic effort on the part of the roads themselves. The change in the organization of the Car-Builders' Association, which will be consummated at Niagara, is a step, and only a step, in the right direction. It is a beginning of that co-operation which is absolutely indispensable, and whatever good results are to follow must be reached by and through the Association as the instrumental means. It is, however, only an instrument, but a very important one. The contemplated reforms must be well considered before they are embodied in specific recommendations. They can, at the best, only be introduced gradually, and the longer they are deferred the slower will be their progress. It should be borne in mind that the present meeting is only preparatory, and by no means a finality, the object being to perfect the new machinery and get it in working order for next June, when the real business will begin. It is an old saw that large bodies move slow. When the Association adjourns next week, it will be a larger body in more than one sense than it ever was before. The membership will be increased, and it will have a constituency that will keenly scrutinize its doings in the future.

In view of the fact that the chief duty which will devolve upon the new organization will be the establishment of standards for certain parts of cars that are now extremely diversified, it strikes us that the aid of a mechanical "syndicate" of ability and experience would be of great service in determining which of the numerous forms of construction are the best. The drawing and braking attachments to freight cars are of such a nature that standards, in order to be recognized and used as such, must be the best, at least for the time being, or they will be standards only in name. It is possible that the time may come when State laws will make the use of such standards compulsory, but this is only another and more forcible reason why they should be the best that can be devised, before being adapted by the Association or the roads.

CAR COUPLINGS IN ENGLAND AND AMERICA.

An exhibition of working models of railway car couplings is to be held at Darlington, England, from the 3d to the 7th of the present month, under the auspices of the Amalgamated Society of Railway Servants of England, Scotland, Ireland and Wales. The object of the society is to get together as many of these appliances, both from the United Kingdom and elsewhere, as is practicable, in order to examine and test their comparative merits and determine which are the best for the protection of train men. To what extent American inventions of this class are to be represented we are unable to say, but if sufficient time were allowed for the making of entries, the representation would certainly be very large. Even if the same devices could be put on exhibition at Darlington that were exhibited at Hartford last November, for the inspection of the Connecticut railroad commissioners, and a well considered report made by competent judges as to their merits, it would interest many people on this side the water. But we apprehend when it comes to the vital point of a square and unqualified indorsement of any one or more of these devices, there will be the same hesitation and wavering in England as there is here. The advertisement would be too palpable, and motives originating in favoritism and and self-interest would be suspected, if not openly charged, by the disappointed ones.

It is estimated—upon what authority we do not know—that during a period of five years ending with 1880, there was an average of only 40 train men killed, and 400 otherwise injured, each year on English roads, with a total mileage of about 17,000 miles; while upon our own roads the number of train men killed annually has been put as high as 1,500, and the injured at not less than 5,000 each year. Estimates based upon no reliable data are of little account. But supposing these figures to be correct, and making due allowance for the greater mileage and larger traffic of American roads, the disproportion in the number of casualities is quite startling. The estimates on one side or the other, or both, are either wide of the mark, or else the couplings in use on our cars are far from being what they should be. Either this, or the train men are excessively careless in doing their work. We do not believe that the difference in the number of casualties in the two countries is as great as the figures indicate, but we do believe that freight trains on our roads are handled in a more careless and less systematic way than they are in England, and that our train men are, as a rule, more foolhardy and reckless in exposing themselves to danger than English train men are. The precautions against accidents in the running of freight trains particularly can never be so complete, either in the matter of coupling or in the liability to fall between the cars in working the brakes and passing from the roof of one car to another, as to protect men who are careless about protecting themselves. This branch of railway service is a dangerous occupation, like going to war, and those who engage in it voluntarily assume the risks. There is, in fact, something about it that is alluring and attractive. There are ready recruits to fill all vacancies caused by accidents or otherwise, and for small wages at that. No railway manager or other officer requires men to go between cars to be caught and crushed, or tripped up and run over, and yet it is done every day. We have been told, and we believe it to be true, that if the men were required in all cases to use a forked-stick in guiding the link under penalty of dismissal from service, they would as a rule prefer to use their arms and hands and take the chances both of getting hurt and being discharged. No automatic contrivance that would couple and uncouple in every case with the intelligence of a rational being can wholly prevent these accidents unless it can at the same time keep the men from going between the cars, and no patent coupling claims to do this so far as we are aware.

PATENTS.

There can be no question as to the extreme liberality of our patent laws in view of the fact that the number of patents issued has increased from 435 in 1837 to 263,669 at the end of August, 1882. If the annual increase shall continue in the same ratio that it has for the last two decades —and there is no reason why it will not if the existing patent laws remain unchanged—the number at the close of the century will not fall much short of a million. But it is not likely that this extreme will be reached. The business of the bureau has already become so unwieldy and complicated as to render a change of the laws, more or less radical, an absolute necessity, not only for facilitating the business of the department, but for protecting the interests of inventors and patentees. Liberality, like many other good things, has its limitations. In the matter of patents, if it is profuse and undiscriminating, it becomes a positive evil by lowering the standard and cheapening the product. The privilege granted to the inventor has but a dubious commercial value unless it carries with it some evidence that the invention is new and practically useful. Inventors as a class are impecunious and needy, and are eager to dispose of their rights as soon as they are in possession of the coveted parchment and official seal. Purchasers, however, must look out for their own interests, knowing as they do that patents are granted with little or no reference to the practical utility of inventions, and that the examiners have only a limited record to enable them to determine whether the great majority of claims have sufficient originality to stand the ordeal of litigation. If they purchase they do so at a risk which does not warrant the paying of high prices. Inventors also labor under the disadvantage of not knowing, without a laborious and expensive search, what rights have been acquired in any particular line of invention, and which, if not ascertained with accuracy, would result in a waste of time and useless expenditure of labor.

The whole patent system needs a thorough reconstruction in the interest of all concerned, and especially of inventors, of whom it has been said that not more than one in a hundred ever gets remunerated for the trouble and cost of maturing his invention and getting a patent. The inventive activity of our population has outgrown the capabilities of the present system, and whatever may be done to improve it in other respects, it should cease to be a source of revenue to the government. Whatever excess there may be of income over expenditure is an evidence either that the fees are too high or that the income is not properly applied in the working of the department. With the present craze for patent rights, and the low estimation in which the great majority of these grants are held, as representing money values, the system as it now is will soon become an obstruction to mechanical and scientific progress, instead of a help and encouragement.

THE MONTGOMERY PALACE STOCK CARS.

The account on another page of a rapid transit cattle train trip from Chicago to New York is condensed from a lengthy and somewhat rose-colored article in the New York *World*, in which the writer speaks of the success of the experiment in the most unqualified terms. It is declared to be a "revolution in cattle shipping;" "the animals reached their destination in remarkably fine condition;" "they partook of their feed and water on the way with eagerness and gusto;" and were, in fact, "absolutely happy," none of them being horned or trampled to death, or injured in any way. It is even said that at one time during the trip no less than 96 of the animals were "lying down with comfort." When it is considered that the train load consisted of 361 cattle, at an average weight of 1,160 pounds each and 18 cattle to a car, and that the cars were 36 feet long inside, which allowed just 24 inches longitudinal space for each animal, including the partitions between the compartments, the trip, it must be admitted, was a remarkably successful one both in a humane and commercial point of view.

It is to be hoped that this apparently successful attempt to put an end to the abuses and barbarities that have so long been practiced in live stock transportation will not prove delusive. Palace stock-cars, so-called, were designed and patented ten years ago. They were 36 feet long inside and 9½ feet wide, had movable partitions, swing-beam trucks and elliptic springs, and would carry 16 cattle of average size and give them plenty of room. Yet these cars were not a success, even at ordinary freight train speed; or rather, the road companies would not build them because shippers did not care to pay the additional cost of transportation involved in giving that much floor space to that number of animals. There was no difficulty about the feeding and watering. These dimensions, it will be observed, are almost exactly the same as those of the Montgomery cars, and yet the latter carry two more animals to a car and give less space to each. It is manifest that the comfort of the cattle during the two days' trip from Chicago to New York, as well as their good condition on arrival, was not due to any extra floor space in the cars, but to something else. We suspect that the peculiar construction of the trucks used had a good deal to do with it, by giving the car body and load an easy lateral and longitudinal motion, and saving the animals from the lurches and jolts incident to ordinary running gear on curves and irregularities of track. This could easily be tested by putting rigid trucks under a car with the same load, and running it the same distance at the same speed. The air brakes, also, were a great help in making stops, besides saving much time.

No style of stock car is likely to bring about a permanent revolution in the transportation of cattle that does not promote the comfort of the animals without increasing the cost of carrying them. With shippers it is a matter of business and competition. It is for their interest to have live stock reach the market with as little delay and loss in weight as possible, and to have as much weight as possible carried in a car. If rapid-transit cars, with suspension trucks and air brakes, will save enough in time and weight to compensate for the additional cost of transportation, then it is quite certain that such cars will be preferred to ordinary stock cars. If the Montgomery cars can do this, they will prove a success, whether operated on the Pullman basis, or whether they are built and owned by the roads. If the one trip that has been made from Chicago to New York is a fair criterion of their capacity, other trips will follow, and each will demonstrate more completely the success of the plan.

PASSENGER AND FREIGHT RATES.

The *International Guide* has an article on this subject, from which we take the following:

"Undoubtedly much of the prejudice existing against railroads is caused by the high rates charged for transporting passengers, which, compared with the freight charges, are outrageously high. Within fifteen years the freight tariff has been reduced on an average of eighty to ninety per cent., while the passenger rates are as high, if not higher, than they were during the civil war.

"No well-informed man who has given the subject any thought will deny that these rates could be very much lowered with profit to the railroads and benefit to the people. Passengers load and unload themselves—freight has to be loaded and unloaded. The passenger describes his own stopping-place, gets his own bill of lading when he buys his ticket. The grain, barrel or animal has to be brought to the depot, weighed there, a bill of lading obtained, put on the train, cared for during transit, and unloaded and stored when it reaches its destination.

"We believe that before very many years passengers will be carried for a uniform rate of one cent per mile, and that, too, with a greater profit to the railroads than they now enjoy.

"The elevated roads of New York city, one mile of which cost more to build than one hundred miles of road on a Western prarie, make enormous profits carrying passengers six or eight miles for five cents, and this, too, with no freight business."

The above is a fair index of the popular impression in regard to the disparity between passenger and freight rates. Every body knows that railway freight charges have been reduced enormously within the past twenty years, and that the reduction has been steady and continuous, while passenger rates are about as high as ever. A superficial view of the matter would seem to justify the conclusion that the reduction should be substantially the same in both classes of traffic, when in fact the difference between the two is so great that one can not be taken as a criterion for the other in the matter of rates. As an example of the increase of freight tonnage and the reduction of rates, it is stated in Poor's Manual that the number of tons moved by the New York Central & Hudson River road in 1855 was 670,073, the net earnings from which were $2,215,408. In 1881 the same road moved 11,591,379 tons, and the net earnings were only $5,823,536, being an increase of 1,700 per cent in tonnage and 163 per cent in net earnings. The reduced charges have resulted from the enormous increase of tonnage, the large business making up for the reduced rate of profit.

With respect to passenger business, there has been no such corresponding increase in mileage, and no increase at all in net earnings previous to 1880, and scarcely more than a nominal increase since that year. It is, indeed, more than probable that if passenger and freight expenses could be disentangled, so that a right division could be made between the two, the passenger expenses of a great many roads would be in excess of earnings; and, in cases where a fair profit could be shown, it would all be earned by certain trains that carried full loads, while the other trains run with cars partly filled and earned nothing. In the matter of running and incidental expenses, passenger trains are subject to great drawbacks as compared with freight trains. They must run two or three times as fast, and on schedule time, load or no load. The number of cars

to a train ranges from four to twelve as a general thing. They rarely run with every seat filled. The average number of passengers per train in the State of New York does not exceed 70, and this is above the general average throughout the country. Upon this basis, that is, the number of passengers cars actually *do* carry instead of the number they *can* carry, the engines have to haul an average weight of about 3,000 pounds of car per passenger, and the average weight of passengers is about 150 pounds each. Here is an enormous amount of non-paying weight which has to be hauled at the average passenger-train speed by an engine which could easily haul twice the weight at freight train speed, and the vast majority of freight cars carry fully their own weight of paying load in one direction, and more or less of return freight in the opposite direction. When there is nothing to do they can stand still on the side tracks.

The first cost and subsequent repairing of passenger equipment involves a vast expenditure, the interest upon which is no bagatelle. Costly brake and signal systems, and a multitude of other appliances designed mainly to insure the safety of passenger trains and avoid losses and damages from accidents, combine to swell the operating expenses. The cars, also, are many of them excessively fine and luxurious, with the devices for comfort carried to an extreme. But this is as much the fault of the public as of the railroads, and the same is true with respect to high speed. Of two parallel roads, the one that runs the fastest trains will get the most passengers, and if anybody gets hurt he is not apt to underestimate the damage when he puts in his claim for remuneration. It must, however, be admitted in the face of all this, that passenger rates are relatively high as contrasted with freight rates, but we can not see how they can be much lower unless more people travel, or unless those who do travel will consent to ride in cheaper cars and at slower speed.

As regards the elevated roads, the trains are light and run at intervals of a few minutes and at slower speed than on steam surface roads, a great number of short trip passengers are carried during the day at ten cent fares instead of five cents, while during the half-fare hours in the morning and evening the cars in one direction are filled to their utmost capacity. As for the "enormous profits," we are not prepared to speak with positive certainty.

PAINT AS A CAR ILLUMINATOR.

In these days, when the subject of electric lighting is receiving so much attention, there are some sanguine people who indulge the hope that the nocturnal gloom will soon be dispelled from railway cars sufficiently to enable their occupants to read newspapers in the evening. Candles, oil and gas have been tried with no very marked success, and now it is reported that an English railway carriage has been lighted with luminous paint. Although the paint was applied to only half the available space in the car, the phosphorescent glow was so intense that small objects could be readily distinguished while the car was passing through the Thames tunnel, and even the time could be told from the face of a watch. Considering the kind of illumination we have on some of our local and express trains even, this is certainly a pretty good beginning for the paint. As an illuminating agent it is yet in its infancy, no doubt, but great things sometimes result from small beginnings. Unless something practical shall be accomplished before long with electricity, we shall rest our hopes on the paint, and eagerly wait for further developments. Moonlight is a good thing in its way, and would speedily do away with the lighting apparatus in some of our cars were it not for the waning of the satellite and the frequency of cloudy weather. We have no desire to treat such a serious matter with unbecoming levity, but really it is time that poorly lighted passenger cars were better lighted. There are plenty of gorgeous-looking lamps brilliant with metallic lustre, and plenty of announcements of new and economical devices to make cars blaze with light without setting fire to them, but somehow they do not seem to work their way very rapidly into general use. We traveled last week on a number of way and express trains in the night time, and on different roads, and the lighting of nearly every car that we happened to be in was a reproach to civilization—we mean railroad civilization. We do not like to be invidious by mentioning names. The "illumination" was a sickly glimmer, enlivened now and then by the lantern of the conductor. We should be more hopeful of the paint were it not for the suggestion in the notice of its performance in the English car, that the railway companies will be enabled to effect a considerable saving in gas and oil by using it. If it is merely to take the place of gas and oil, instead of reinforcing them, the prospect is dubious. There is encouragement, however, in the brief account in another column of the lighting of a car with electricity on the Pennsylvania railroad.

THE Pittsburg, McKeesport & Youghiogheny Railroad Company have given the Milton Car Works Company an order for 400 box cars, 300 coal cars, and 20 passenger cars.

MR. ARIBEL WELCH, President of the United New Jersey Railroad & Canal Company, and of the American Society of Civil Engineers, died in Lambertville, N. J., Sept. 25, aged 73 years.

THE annual meeting of the Master Car Painters' Association at Chicago on the 20th ult. was more largely attended than any previous meeting since the association was organized. Forty-seven members, answered to the roll call, but the actual number present at the convention was somewhat more than this. The discussions were more animated and interesting than usual, and a number of carefully prepared papers were read upon the subjects designated at the last previous meeting. We make room for two of these papers in our present issue. The members of the association were entertained during their stay in the city in various ways, including trips to the new town of Pullman, where a banquet was served, and to the shops of the Chicago and Northwestern Railway. The officers chosen for the ensuing year were: D. D. Robertson, of the Michigan Central Road, President; John Rattenbury, of the Chicago, Rock Island & Pacific, Vice-President; and Robert M'Keon, of the New York, Pennsylvania & Ohio, Secretary. The next annual meeting will be held at Baltimore, Md.

THE MT. SAVAGE, (MD.), LOCOMOTIVE WORKS are owned and controlled by the Cumberland & Pennsylvania Railroad Co., who have been using them for the building and repairing of their own engines. The capacity of the works having been considerably increased by additions and improvements, they are now prepared to fill outside orders, the facilities being of the best for the construction of standard and narrow-gauge locomotives, and especially those of the "consolidation" type. These latter are built from 45 to 50 tons for standard gauge, and from 28 to 30 tons for narrow gauge. The works are under the management of experienced and practical men, of which the condition and successful operation of the above-named road, in the carrying of 2,000,000 tons of coal during the past year, is a sufficient evidence. The sale of the engines has been placed in the hands of Thomas B. Inness & Co., 55 and 57 Pine street, New York, to whom are referred all correspondence relating to prices and contracts.

VALENTINE & COMPANY, the well-known varnish manufacturers, have removed their main office from 323 Pearl street to 245 Broadway, New York.

THE New York, Providence & Boston Railroad Co. are putting in two improved bucket plunger steam pumps made by the Valley Machine Co., of Easthampton, Mass., in place of two of the old style pumps that have been in use twelve years.

THE BRADLEY MANUFACTURING CO. (formerly H. C. Bradley & Co., of Milwaukee), have established their works in Chicago, and are manufacturing Bradley's insulated air cover for boilers, steam, hot-air and water pipes. Their facilities for the manufacture of the article are first-class, and they are supplying it on an extensive scale.

THE *Northwestern Lumberman* of Chicago will issue a mammoth "extra" in January next, containing a directory of all the saw mills in the United States. The extra will contain 200 pages, illustrated with drawings and specifications, and will also be published in book form.

A Mixed Train.

On some of the western roads they attach a passenger car to a freight train, and call it "mixed." It isn't in the order of things that such trains should travel very rapidly, and sometimes there is considerable growling among the "traffic."

"Are we most there, conductor?" asked a nervous man for the hundredth time. "Remember, my wife is sick, and I am anxious."

"We'll get there on time," replied the conductor, stolidly.

Half an hour later the nervous man approached him again.

"I guess she's dead now," said he, mournfully, "but I'd give you a little something extra if you could manage to catch up with the funeral. Maybe she won't be so decomposed but what I would recognize her!"

The conductor growled at him and the man subsided.

"Conductor," said he, after an hour's silence, "conductor, if the wind isn't dead ahead, I wish you would put on some steam. I'd like to see where my wife's buried before the tombstone crumbles to pieces. Put yourself in my place for a moment."

The conductor shook him off, and the man relapsed into profound melancholy.

"I say, conductor," said he, after a long pause, "I've got a note coming due in three months. Can't you fix it so as rattle along a little?"

"If you come near me again, I'll knock you down!" snorted the conductor, savagely.

The nervous man regarded him sadly and went to his seat. Two hours later the conductor saw him chatting gayly, and laughing heartily with a brother victim, and approached him.

"Don't feel so badly about your wife's death?"

"Time heals all wounds," sighed the nervous man.

"And you are not so particular about the note!" sneered the conductor.

"Not now. That's all right. Don't worry. I've been figuring up and I find that the note has outlawed since I spoke to you last."

MR. GEORGE W. MORRIS, Agent of the French Spiral Spring Co. and the Pittsburg Cast Steel Spring Works, has fitted up elegant ground floor offices at 246 South Clark street (Grand Pacific Hotel) Chicago, which will be his address in future, and the headquarters of the above-named establishments in Chicago.

SOFT woods may be turned so smooth as to require no other polish than that which can be given by holding fine shavings of the same wood against them in the lathe. For polishing mahogany, walnut and some other woods, the following formula is given: Dissolve beeswax by heat in spirits of turpentine until the mixture becomes viscid. Apply a clean cloth, and rub thoroughly with another flannel or cloth. Beeswax is sometimes alone used. For work in position, it must be melted and applied and rubbed as above. For work in the lathe, it can be applied by friction, the slight amount of wax melted being sufficient for the polish. The work should be thoroughly rubbed. Mahogany may be polished by rubbing first with linseed oil, and then by a cloth dipped in very fine brick-dust. Some hard woods have a natural polish, and do not require a polishing medium. A fine gloss can be produced by rubbing with linseed oil, and then holding shavings or turnings of the same material against the work in the lathe. A very perfect surface can be obtained with glass-paper, which, if followed by hard rubbing, will give a beautiful luster Luster can also be given to carefully finished surfaces by applying a small quantity of thinned varnish, shellac or "fillers" by a cloth, and carefully and thoroughly rubbing.

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Burlington & Missouri River in Neb.—James M. Barr is appointed Purchasing Agent in place of George Hargreaves, resigned.

Chicago & West Michigan.—W. F. N. Davis has been appointed Master Mechanic, with office at Muskegon, Mich.

Connotton Valley.—Samuel Briggs is appointed General Manager in place of W. W. Hungerford, resigned. Mr. Briggs was recently General Superintendent of the Valley road.

Boston, Hoosac Tunnel & Western.—H. L. Morrill has been appointed General Manager. He has been Superintendent of the New York, Chicago & St. Louis road.

Florida Central & Western.—Jas. S. McElroy, previously Master Mechanic, has been appointed Superintendent, vice J. P. Laird, deceased.

Florida Transit.—R. V. Dahoney is appointed Master of Machinery, vice J. N. Webster, resigned.

Humeston & Shenandoah.—M. B. Snyder is Master Mechanic, at Clarinda, Ia.

Indiana, Bloomington & Western.—C. T. Tyler, previously Assistant Superindendent, is now Superintendent of the Ohio and Middle Divisions.

Kentucky Central.—G. W. Bender has been appointed Superintendent, in place of J. H. Setchel, resigned.

Louisville, Evansville & St. Louis.—W. H. Field has been appointed Purchasing Agent. He was previously Auditor.

Mexican Central.—D. B. Robinson is appointed General Superintendent in place of George T. Anthony. His office is at El Paso del Norte, Mexico.

Mexican National.—R. C. Peebles has been appointed Superintendent, with office in City of Mexico.

New York, Chicago & St. Louis.—E. E. Dwight is appointed Superintendent of this road, with headquarters at Cleveland, O.

New York, Lake Erie & Western.—M. Gunn has been appointed Master Mechanic at Hornellsville, N. Y., in place of George H. Griggs, who has gone to the Rhode Island Locomotive Works. Mr. Gunn has been for a long time Foreman of the Salamanca shops.

New York & New England.—C. C. F. is appointed Superintendent of Eastern Division, with headquarters at Boston. D. P. Wright is Master Mechanic, and H. B. Barker, General Foreman of shops at Norwood.

New York, Pennsylvania & Ohio.—P. D. Cooper has resigned the position of General Manager on account of ill health, and J. M. Ferris, heretofore Superintendent of Transportation, has been appointed as his successor.

Pennsylvania.—Chas E. Pugh is General Manager in place of Frank Thomson; S. M. Provost, Gen. Supt. Penn. R. R. Div., in place of Pugh; W. J. Latta, Supt. Phila. Div., in place of Provost; and Jas. Reed, Supt. Altoona Div., in place of Latta; Frank L. Sheppard is Supt. Motive Power, Penn. Div.; H. S. Hayward, Supt. Motive Power, New Jersey Div.; and R. H. Soule, Supt. Motive Power of Phila. & Erie Div.; Alfred Waters succeeds F. L. Sheppard as Supt. Sunbury, Hazelton & Wilkesbarre Div

Sabine & East Texas.—Charles Bunn has been appointed Master Mechanic, with office at Beaumont, Texas.

St Louis, Iron Mountain & Southern.—H. H. Sessions has been appointed Master Car-Builder.

Terre Haute & Indianapolis.—Geo. H. Prescott is appointed Superintendent of Motive Power and Machinery, with office at Terre Haute, Ind., vice C. R. Peddle, who is appointed Purchasing Agent, with office at Terre Haute, Ind.

Toledo, Cincinnati & St. Louis.—D. C. Bacon has been appointed Superintendent of the Southeastern Division in place of R. B. Jones, resigned.

Wabash, St. Louis & Pacific R.—W. S. Lincoln, Chief Engineer, has been appointed Purchasing Agent also, vice R. W. Green.

Wheeling & Lake Erie.—J. S. Oliver has resigned the position of Superintendent.

Employment.

Advertisements will be inserted under this heading for one dolla for each insertion.

WANTED.—A situation as Foreman Painter in a Railroad Paint Shop. Have had fifteen years' experience, and have also had charge of a shop for six years. The best of reference furnished. Address replies to NATIONAL CAR-BUILDER, Morse Building, New York, N. Y.

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CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTEIN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chicago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
NAUGATUCK RAILROAD CO., G. W. Beach, Superintendent, Waterbury, Conn.
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., R. N. Dowd, Commissary, New Haven, Conn.
UNION PACIFIC RAILROAD CO., } A. D. Clark, Purchasing Agent, Omaha, Neb.
KANSAS " " " " }
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky
GRAND TRUNK RAILWAY N. Wall, Port Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.
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R. T. Wilson & Co., Bankers, N. Y.
J. M. Crane, Cashier Nat'l Shoe & Leather Bank, N. Y.
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J. M. Toucey, Gen'l Sup't N. Y. C. & H. R. R. R., N. Y.
G. B. Roberts, Pres't Pennsylvania R. R., Phila., Pa.
A. J. Cassatt, Vice Pres't " " "
Frank Thompson, Gen. Man." " "
Thomas Cochran, Pres't Guarantee Trust and Safe Deposit Co., Philadelphia, Pa.
Robert Garrett, V-Pres't B. & O. R. R. Co., Baltimore.
John M. Robinson, Pres't Bay Line, Baltimore, Md.
Hon. John C. New, A. Sec'y Treasury, Washington.
James McCrea, Man. P. C. & St. L. Ry., Columbus.
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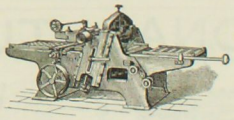

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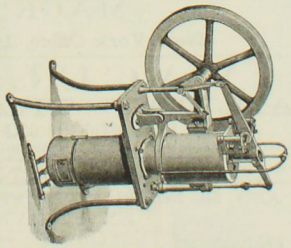

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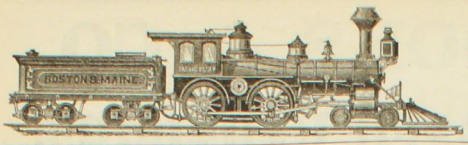

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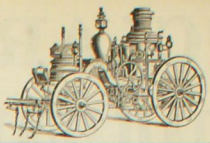

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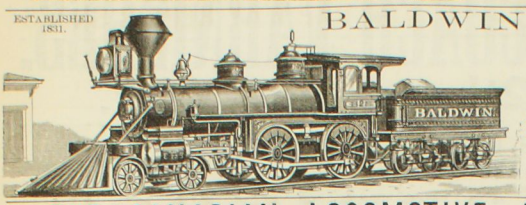

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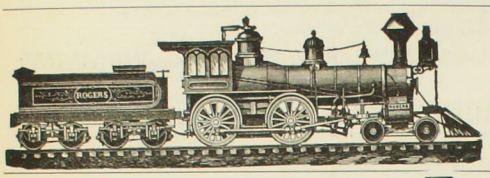

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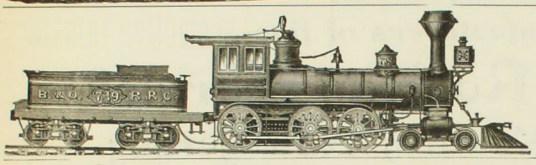

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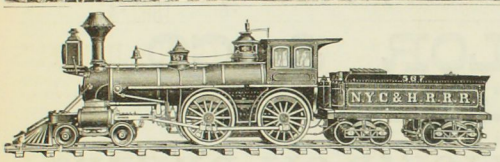

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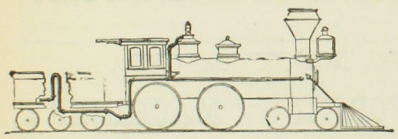

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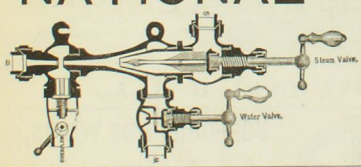

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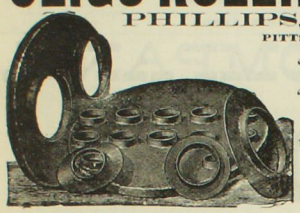

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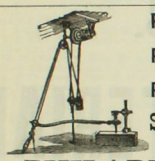

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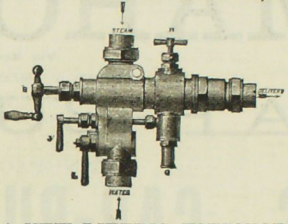

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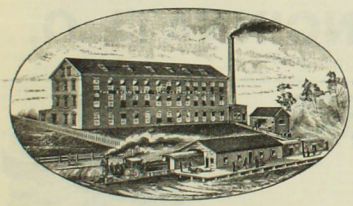

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This is the only substitute for UPPER LEATHER in the world that has PROVED SATISFACTORY OR PRACTICAL, and that cannot be distinguished from leather. Being very handsome and durable, not affected by heat or cold, and impervious to oil or water, it is for many purposes superior to leather, and costs from 33 to 50 per cent. less. It is manufactured in various weights and in every desirable shade of color, including also gold, silver and bronze. It comes in rolls of 30 and 50 yards, and 36 and 50 inches in width. A corporation has recently been organized under the laws of New Hampshire—where the factory is located—for the manufacture of this Artificial Leather, under various letters patent granted by the United States. A full assortment of the above most desirable goods can be found and articles made from it shown, at office and salesrooms, 92 Pearl street, corner of High street, Boston, Mass. Send for price list to the

Evans Artificial Leather Company.

GEORGE A. ALDEN, President. H. S. CHASE, Treasurer. WALTER N. DOLE, General Agent.

1882.--IMPROVED IRON STEAM SHOVEL AND DERRICK.

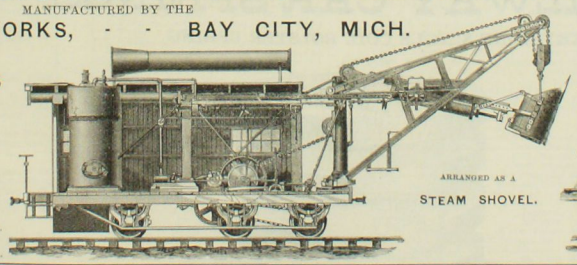
MANUFACTURED BY THE

INDUSTRIAL WORKS, - - BAY CITY, MICH.

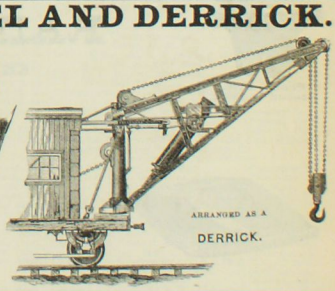
TURN-TABLES OF Iron and Wood.

C. R. WELLS, Sec'y, Bay City, Mich.

McMANN & BRO., 58 Gold st., N. Y.



ARRANGED AS A STEAM SHOVEL.



ARRANGED AS A DERRICK.

PHOSPHOR-BRONZE,

TRADE MARKS:

FOR BEARINGS OF LOCOMOTIVES, CARS AND MACHINERY

SLIDE VALVES, CYLINDER RINGS AND STEAM CONNECTIONS.

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Office, 512 Arch Street, Philadelphia, Pa.

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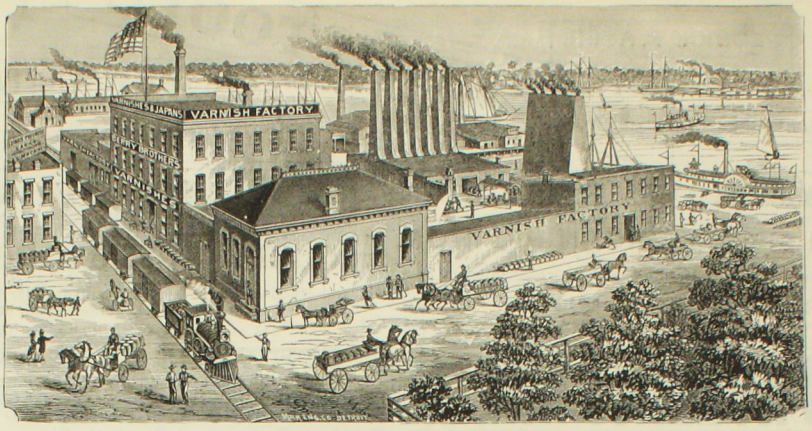
BERRY BROTHERS, DETROIT, MICH., MANUFACTURERS OF RAILWAY VARNISHES.

ESTABLISHED IN 1858. USE BERRY BROTHERS' RAILWAY VARNISHES.



Frontage on Wight Street, 218 ft.

Frontage on Lieb Street, 200 ft.

ESTABLISHED IN 1858. USE BERRY BROTHERS' RAILWAY VARNISHES.

B. R. MILLER, General Eastern Agent. W. L. EN EARL, General Western Agent.

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(Via New Orleans),

MANUFACTURED TO SIZES SPECIALLY ADAPTED FOR

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CHARLES SCOTT,

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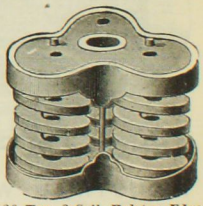
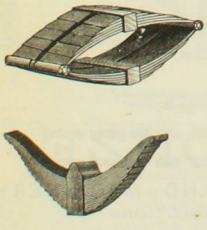
RAILWAY CAR SPRINGS.

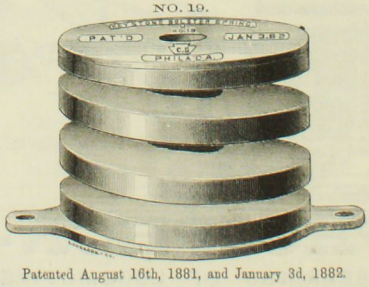
KEYSTONE SINGLE COIL BOLSTER SPRING.

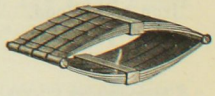


20 Ton 3-Coil Bolster Edge Rolled.

NO. 10.







Patented August 16th, 1881, and January 3d, 1882.

Capacity, 35,000 Pounds Each.

Motion Very Soft and Slow.

1028 TO 1038 NEW MARKET STREET, PHILADELPHIA PA

DIRECTORY

of the Railroads of the United States and Canada, showing the gauge, length of road, number of locomotives and number of cars; and giving the names and titles of their principal officers in charge of the operating, purchasing and rolling stock department.

A

Adirondack R. R. 4-8½ gauge 62 m. 3 lo. 62 cars.
C. E. Pirkee, *Supt* ..... Saratoga, N. Y.
Jacob Myers, *M. M.* ..... Saratoga, N. Y.
Jas. J. Travers, *M. C. R.* ..... Saratoga, N. Y.
Alabama Great So'n R. R. (*See Cin., N. O. & T. P.*)
Albany & Susquehanna R. R. (*See D. & H. Canal Co.*)
Albert Ry. 4-8½ g. 51 m. 3 lo. 32 cars.
G. A. Robinson, *Manager* ..... Hillsboro, N. B.
Jas. McKay, *M. M. & C. B.* ..... Hillsboro, N. B.
Allegany Central R. R. 3 gauge 30 miles.
Geo. H. Chapman, *Gen. Man.* ..... Angelica, N. Y.
W. O. Chapman, *Gen. Supt.* ..... Friendship, N. Y.
Allegheny Valley R. R. 4-9 g. 250 m. 75 lo. 1968 c.
David McCargo, *Gen. Supt. & Pur. Agt.* ..... and
C. B. Price, *Supt.* (Riv. Div.) ..... Pittsburg, Pa.
A. A. Jackson, *Supt.* (L. G. Div.) ..... Brookville, Pa.
Geo. W. Glass, *M. M* ..... Verona, Pa.
R. Gunning, *M. C. B.* ..... Verona, Pa.
Alliance & Lake Erie R. R. 3 g. 30 m. 3 lo. 112 cars.
W. E. Lewis, *Gen. Man* ..... Alliance, O.
C. C. Dorman, *M. M. & M. C. B.* ..... Alliance, O.
Annapolis & Elk Ridge R. R. 4-8½ g. 20 m. 4 lo. 29 c.
W. H. Binns, *Supt. & Pur. Agt.* ..... Annapolis, Md.
John L. Beall, *M. Mach.* ..... Annapolis, Md.
Arkansas Midland R. R. 3-6 g. 48 m. 4 lo. 45 cars.
A. H. Johnson, *Pr. & Gen. Man.* ..... Helena, Ark.
J. B. Johnson, *M. M. & M. C. B.* ..... Helena, Ark.
Ashland Coal & Iron Ry. 4-8½ g. 14 m. 7 lo. 425 c.
Douglas Putnam, Jr., *Gen. Supt.* ..... Ashland, Ky.
Robt. Peebles, *Pur. Agt* ..... Ashland, Ky.
E. M. Roberts, *M. M.* ..... Ashland, Ky.
Ashtabula & Pittsburgh Ry. (*See Cleve., Col. & Cin.*)
Asheville & Spartanburg R. R. 5 g. 49 m. 2 lo. 12 c.
Jas. Anderson, *Supt. & Pur. Agt.* Spart'b'g, S.C.
Wm. Platt, *M. M.* ..... Spartanburg, S. C.
W. B. Brown, *M. C. B.* ..... Spartanburg, S. C.
Atchison, Topeka & Santa Fé R. R.
1,840 m. 203 lo. 8,108 cars.
C. C. Wheeler, *Gen. Man.* ..... Topeka, Kan.
D. J. Chase, *Gen. Supt.* ..... Topeka, Kan.
W. S. Mellen, *Asst. Gen. Supt.* ..... Topeka, Kan.
F. M. Smith, *Pur. Agt.* ..... Topeka, Kan.
Geo. Hackney, *Supt. Lo. & Car. Dept* ..... do.
Clem. Hackney, *M. M.* ..... Topeka, Kan.
Eastern Div.: C. M. Rathbun, *Supt.*, Topeka, Kan
Henry Hull, *G. F. Car Dept.* ..... Topeka, Kan.
John Fagan, *M. M.* ..... Atchison, Kan.
J. M. Smith, *M. M.* ..... Kansas City, Mo.
W. W. Wheeler, *M. M.* ..... Emporia, Kan.
Mid. Div.: H. R. Nickerson, *Supt.* ..... Topeka, Kan.
W. Y. Johnson, *M. M.* ..... Nickerson, Kan.
J. Q. Adams, *M. M.* ..... Dodge, Kan.
Col. Div.: W. Borst, *Supt.* ..... La Junta, Col.
A. C. Stiles, *M. M.* ..... La Junta, Col.
D. H. Dotterer, *M. M.* ..... Raton, N. M.
Las Vegas R.: Geo. L. Sands, *Supt.* Las Vegas, N. M.
L. H. Waugh, *M. M.* ..... Las Vegas, N. M.
Rio G. Div.: Geo. L. Sands, *Supt.* Las Vegas, N. M.
M. C. Wheeler, *M. M.* ..... Wallace, N. M.
T. Clyde, *M. M.* ..... San Marcial, N. M.
H. P. Olcott, *M. M.* ..... Deming, N. M.
Atlanta & West Point R. R. (*See Western of Ala.*)
Atlantic & Pacific R. R. 4-8½ g. 286 m.
F. W. Smith *Gen. Supt.* ..... Albuquerque, N. M.
B. W. Angell, *Div. Supt.* ..... Albuquerque, N. M.
Geo. Chandler, *Supt. M. P. & M.* ..... do.
D. B. Sibley, *Pur. Agt.* ..... Chicago, Ill.
Augusta & Knoxville R. R. ..... 30 miles.
Gen. Supt & M. M., Augusta Ga.

B

Baltimore & Ohio R. R.
4-8½ g. 1,539 m. 546 lo. 14,882 cars.
N. S. Hill, *Pur. Agt.* ..... Baltimore, Md.
E. Ohio Riv. Div. ..... 4-8½ g. 972 m.
W. M. Clements, *Mast. Trans.* ..... Baltimore, Md.
N. E. Chapman, *Mast. of Mach.* ..... Baltimore, Md.
A. J. Cromwell, *Asst. M. of M.* ..... Baltimore, Md.
L. Packard, *M. C. B.* ..... Baltimore, Md.
I. N. Kalbaugh, *M. M.* ..... Baltimore, Md.
Wm. Edwards, *M. M.* ..... Martinsburgh, W. Va.
Sam. Preston, *M. M.* ..... Piedmont, W. Va.
Robert Maxwell, *M. M.* ..... Cumberland, Md.
S. B. Crawford, *M. M.* ..... Grafton, W. Va.
Alex. Laird, *M. M.* ..... Parkersburg, W. Va.
Chas. Hirsch, *M. M.* ..... Newark, O.
Pitts. Div.: T. M. King, *Gen. Supt.* ..... Pittsburg, Pa
J. E. Sampsell, *M. of Mach.* ..... Connelsville, Pa.
Trans-Ohio Divs.: B. Dunham, *G. Man.* ..... Newark, O.
W. H. Harrison, *Mast. of Mach.* ..... Newark, O.
R. L. Metzgerber, *M. M.* ..... Newark, O.
H. M. Ingler, *M. M.* ..... Bellaire, O.
O. B. Perkins, *M. M.* ..... Zanesville, O.
Andrew Beckert, *M. M.* ..... Sandusky, O.
F. J. Gunther, *M. M.* ..... Chicago Junction, O.
Chi. Div.: John Thomas, *Supt.* ..... Chicago, Ill.
Benj. Lowther, *M. M.* ..... Garrett, Ind.
W. H. Wilkinson, *M. M.* ..... Kingston, Ill.
Baltimore & Potomac R. R. (*See Penna. R. R.*)
Bangor & Piscataquis R. R. 4-8½ g. 63 m. 4 lo. 87 cars.
Arthur Brown, *Supt.* ..... Bangor, Me.
C. S. Nason, *M. M.* ..... Bangor, Me.
J. W. Comins, *M. C. B.* ..... Oldtown, Me.
Barclay R. R. 4-8½ g. 16 miles.
F. F. Lyon, *Supt.* ..... Barclay, Pa.
J. A. Hardenburg, *Pur. Agt.* ..21 Cort. st., N. Y.
Wm. Johnson, *M. M* ..... Barclay, Pa.
Bedford, Springville, Owensburg & Bloomfield Ry.
3 g. 41 m. 5 lo. 65 cars.
Jas. W. Kennedy, *Gen. Supt. & Pur. Agt.*; and
Capt. Geo. Elliott, *M. M.* ..... Bedford, Ind.
Richard G. Elliott, *M. C. B.* ..... Bedford, Ind.
Bellaire & South-Western Ry. Co. 3 g. 42 m. 3 lo. 29 c.
S. J. Cochren, *Gen. Man.* ..... Bellaire, O.
Bell's Gap R. R. 3 g. 23 m. 2 lo. 35 cars.
R. G. Ford, *Supt* ..... Bellwood, Pa.
A. Zimmerman, *M. C. B.* ..... Bellwood, Pa.
Bennington & Rutland Ry. 4-8½ g. 9 m. 10 lo. 214 c.
C. P. White, *Supt. & Pur. Agt.* Bennington, Vt.
G. W. Blanchard, *M. M.* ..... Rutland, Vt.
Bingham, Canyon & Camp Floyd, and
Wasatch & Jordan Valley R. R.'s.
3 g. 44 m. 7 lo. 300 cars.
J. G. Kennedy, *Gen. Man.* ..Salt Lake City, Utah
Geo. W. Young, *Supt.* ..... do.
Bodie Lumber Co. ..... 3 g. 34 miles.
Thomas Holt, *Supt. & Pur. Agt.* ..... Bodie, Cal
E. M. Luckett, *M. M. & C. B.* ..... Bodie, Cal.
Boston, Barre & Gardner. 4-8½ g. 36 m. 7 lo. 107 c.
H. M. Witter, *Supt. & Pur. Agt.* Worcester, Mass.
Chas. F. Brigham, *M. M.* ..... Worcester, Mass.
Boston Concord, Montreal & White Mts. R. R.
4-8½ g. 107 m. 34 lo. 677 cars
James A. Dodge, *Gen. Man.* ..... Plymouth, N. H
J. Thos. Vose, *Pur. Agt.* ..... Boston, Mass.
R. Adams, *M. M.* ..... Lake Village, N. H.
G. A. Ferguson, *Asst. M. M. & C. B.* ..... Lake Village, N. H.
L. D. Pickering, *M. C. B.* ..... Lake Village, N. H.
Boston, Hoosac Tunnel & W'n Ry.
4-8½ g. 53 m. 17 lo. 1,112 cars.
H. L. Morrill, *Gen. Man.* ..... Mech'ville, N. Y
J. L. Wellington, *Gen. Supt.* Mechanicville, N. Y.
J. L. Wellington, *P. A* ..... Mechanicville, N. Y.
W. H. Powell, *Jr., M. M.* ..... Mechanicville, N. Y.
John S. Ellis, *M. C. B.* ..... Mechanicville, N. Y.
Boston, Lowell & Concord R. Rs.
4-8½ g. 300 m. 110 lo. 2,211 cars.
H. C. Sherburne, *Gen. Man.* ..... Boston, Mass.
F. H. Nourse, *Pur. Agt.* ..... Boston, Mass.
Jas. T. Gordon, *M. M.* ..... Concord, N. H.
J. N. Lauder, *Supt. Roll. Stock* ..Concord N.H.,
Boston & Lowell Div.:
J. F. Crockett, *M. Trans.* ..... Boston.
Concord Divs.:
H. E. Chamberlain, *Supt* ..... Concord, N. H.
J. T. Gordon, *M. M. & C. B* ..... Concord, N. H.
Boston, Revere Beach & Lynn R. R. 3 g. 9 m. 5 lo. 46 c.
L. C. Legro, *M. of Trans.* ..... Boston, Mass.
C. A. Hammond, *Pur. Agt* ..... Boston, Mass.
J. L. Folsom, *M. M.* ..... Boston, Mass.
John Coghlan, *M. C. B.* ..... Boston, Mass.

Boston & Albany R. R. 4-8½ g. 372 m. 248 lo. 6,012 c.
C. O. Russell, *Gen. Supt.* ..... Springfield, Mass.
W. H. Barnes, *Asst. Supt.* ..... Boston, Mass.
A. B. Underhill, *Su. t. M. P.* ..Springfield, Mass.
F. D. Adams, *M. C. B.* ..... Allston, Mass.
W. H. Russell, *Div. Supt.* ..... Albany, N. Y.
H. W. Eddy, *Div. M. M.* ..... Springfield, Mass.
J. B. Weston, *Pur. C. Sh.* ..Springfield, Mass.
G. H. Colby, *Div. M. M.* ..... Boston, Mass.
T. B. Purvis, *Div. M. M.* ..... Greenbush, N. Y.
D. Doran, *Pur. C. Sh.* ..... Greenbush, N. Y.
Boston & Maine R. R. 4-8½ g. 206 m. 84 lo. 2,100 c.
J. T. Furber, *Gen. Supt. & P. A.* ..Boston, Mass.
Wm. Smith, *M. M.* ..... Boston, Mass.
D. C. Richardson, *M. C. B.* ..... Lawrence, Mass.
Boston & N. Y. Air Line. 4-8½ g. 53 m. 9 lo. 150 c.
Jos. H. Franklin, *Supt.* ..... New Haven, Conn.
Boston & Providence R. R. 4-8½ g. 67 m. 47 lo. 960 c.
A. A. Folsom, *Gen. Supt* ..... Boston, Mass.
Geo. Richards, *M. M.* ..... Roxbury, Mass.
Jno. Lightner, *M. C. B.* ..... Roxbury, Mass.
Bradford, Bordell & Kinzua R. R. 3 g. 30 m. 6 lo. 80 c.
E. C. Williams, *Supt. & Pur. Agt.* Bradford, Pa.
John Delaney, *M. M. & C. B.* ..... Bradford, Pa.
Bradford, Eldred & Cuba R. R.
C. D. Williams, *Supt. & P. A.* ..Wellesville, N. Y.
Breakwater & Frankford R. R. (*See Junc. & Break.*)
Brighthope Ry. 3 g. 37 m. 3 lo. 193 cars.
Jas. B. Worth, *Supt* ..... Richmond, Va.
A. Gary, *Supt. Way & Works.* ..Winterpock, Va.
Alex. Calder, *M. M.* ..... Chester, Va.
Brunswick & Albany R. R. 5 g. 172 m. 5 lo. 350 c.
R. D. Meader, *Supt.* ..... Brunswick, Ga.
Buffalo, N. Y. & Phila. Ry. 4-8½ g. 121 m. 34 lo. 2,436 c.
C. D. Williams, *Supt. & P. A.* ..Buffalo, N. Y.
J. H. Poole, *Pur. Agt.* ..... Buffalo, N. Y.
Allen Vail, *Supt. M. P. & M.* ..... Buffalo, N. Y.
Henry Wagner, *M. M.* ..... Buffalo, N. Y.
Buff. Div.: J. T. Gardiner, *Supt.* ..... Buffalo, N. Y.
N. G. Div.: J. W. Watson, *Supt.* ..... Olean, N. Y.
Buff., Pittsburg & W. R. R. 4-8½ g. 156 m. 58 lo. 85 c.
Oliver Watson, Jr., *Gen. Supt.* ..... Buffalo, N. Y.
E. H. Witter, *Pur. Agt.* ..... Oil City, Pa.
H. J. Schaufelberger, *M. M.* ..... Oil City, Pa.
John Monks, *M. C. B.* ..... Oil City, Pa.
Burlington, Cedar Rapids & Northern Ry.
4-8½ g. 644 m. 62 lo. 2,120 cars.
C. J. Ives, *Gen. Supt.* ..... Cedar Rapids, Ia.
Robt. Williams, *Supt* ..... Cedar Rapids, Ia.
T. Sidney, *Pur. Agt.* ..... Cedar Rapids, Ia.
R. W. Bushnell, *M. M. & C. B.* Cedar Rapids, Ia.
Burlington & Lamoille R. R. 4-8½ g. 36 m. 3 lo. 61 c.
F. G. Brownell, *M. M. & Supt Burlington, Vt.*
F. G. Brownell, *M. M. & P. A.* ..Burlington, Vt.
Burlington & Mo. Riv. R. R. (in Neb.) (*See C., B & Q.*)
Burlington, North-Western Ry. 3 g. 38 m. 3 lo. 85 c.
John T. Gerry, *Supt.* ..... Burlington, Ia.
Burlington & Ohio River R. R.
G. F. Merrill, *Gen. Man. & Pur. Agt.* Chicago, Ill.
J. K. Lape, *Supt. of Equip.* ..... Chicago, Ill.

C

Camden & Atlantic R. R. 4-8½ g. 79 m. 16 lo. 264 c.
F. A. Lester, *Supt & Pur. Agt.* ..Camden, N. J
Rufus Hill, *M. M.* ..... Camden, N. J.
Samuel Wills, *M. C. B* ..... Camden, N. J.
Canada Southern Ry. 4-8½ g. 403 m. 89 l. 3,367 c.
W. P. Taylor, *Gen. Man.* ..... Buffalo, N. Y.
A. F. Howland, *Pur. Agt.* ..... St. Thomas, Ont.
W. A. Short, *Gen. M. M.* ..... St. Thomas, Ont.
Robt. Potts, *Gen. M. C. B.* ..... St. Thomas, Ont.
Can. Div. : W. E. Carroll, *Supt.* ..St. Thomas, Ont.
Robert Potts, *M. C. B.* ..... St. Thomas, Ont.
U. S. Div.: E. P. Murray, *Supt.* ..... Toledo, O.
O. P. Dunbar, *M. M.* ..... Grosse Isle, Mich.
Canadian Pacific R. R. 4-8½ g. 551 m. 26 lo. 473 c.
W. C. Van Horne, *Gen. Man.* ..Winnipeg, Man.
Eastern Div. ..... 240 m. 16 lo. 276 cars.
Archer Baker, *Gen. Supt.* ..... Montreal, Can.
Tho. Lynch, *Mech. Supt.* ..... Brockville, Ont.
Western Div. ..... 311 m. 10 lo. 207 cars.
A. B Stickney, *Gen. Supt.* ..... Winnipeg, Man.
Geo. F. Nelson, *Pur. Agt* ..... Winnipeg, Man.
F.C. Butterfield, *M. M. & M. C. B.* Winnipeg, Man.
Cape F'r & Yadkin Val. R. R. 4-8½ g. 47 m. 3 lo. 31 c.
L. C. Cates, *Pres't & Gen. Man.* ..Fayetteville, N. C.
Isaac W. Clark, *M. M. & C. B.* ..Fayetteville, N. C.
Caroline Central R. R. ..... (*See Ral. & Aug.*)
Carson & Colorado R. R. (*See F. & C. Rs. Nevada.*)
Catasauqua & Fogelsville. 4-8½ g. 25 m. 6 lo. 57 c.
C. W. Chapman, *Supt. & P. A.* Catasauqua, Pa.
Thos. E. Sayre, *M. M* ..... Catasauqua, Pa.
Chas. J. Holbach, *M. C. B.* ..... Catasauqua, Pa.
Central and South-Western Railroads (Ga.).
Wheeling, W. Va. 127 lo. 1,838 cars.
W. G. Raoul, *V. P. and G. Man.* Savannah, Ga.
Wm. Rogers, *Gen. Supt* ..... Savannah, Ga.
Henry Yonge, *Pur. Agt* ..... Savannah, Ga.
Cen. Div.: D. D. Arden, *M. M* ..... Savannah, Ga.
John McCann, *M. M.* ..... Augusta, Ga.
James Knight, *M. C. B.* ..... Savannah, Ga.
So.-West'n Div.: W. F. Shellman, *Supt.* Macon, Ga.
D. M. Gugel, *M. M.* ..... Macon, Ga.
James Knight, *M. C. B.* ..... Macon, Ga.
Central R. R. of N. J. 4-8½ g. 544 m. 294 lo. 27,158 c.
Gen. Man. ..... New York, N. Y.
B. W. Burnett, *Pur. Agt* ..... New York, N. Y.
W. W. Stearns, *Gen. Supt.* ..... Elizabeth, N. J.
Cen Div.: Wm. Woodcock, *M. M.* ..Elizabeth, N. J.
Geo. Blackett, *M. C. B* ..... Elizabeth, N. J.
C. G. Williams, *M. M.* ..... Jersey City, N. J.
John Alpaugh, *M. M.* ..... Phillipsburg, N. J.
Long Br. Div.: J. F. Randolph, *Supt.* Elizabeth, N. J.
N. J. So. Div.: R. Blodgett, *Supt.* ..Manchester, N.J.
Wm. Montgomery, *M. M.* ..... Manchester, N. J.
Chas. N. Sawyer, *M. C. B.* ..... Manchester, N. J.
Lehigh & Susquehanna Div.:
W. S. Polhemus, *A. G. Supt* Mauch Chunk, Pa.
C. Brastow, *M. M. & C. B.* ..... Ashley, Pa.
Central R. R. of S. ..... (*See W'n. & Wel.*)
Central Iowa Ry. 4-8½ g. 244 m. 37 lo. 1,487 cars.
D. N. Pickering, *Gen. Supt* ..Marshalltown, Ia.
John Watson, *Gen. Man.* ..... Marshalltown, Ia.
T. L. Seevers, *M. C. B.* ..... Marshalltown, Ia.
Central Pac. R. R. 4-8½ g. 2,777 m. 296 lo. 7,277 c.
A. N. Towne, *Gen. Man.* ..... San Francisco, Cal.
J. A. Fillmore, *Gen. Supt.* ..San Francisco, Cal.
R. H. Pratt, *A. G. Supt* ..... San Francisco, Cal.
J. R. Watson, *Gen. Pur. Agt.* ..Sacramento, Cal.
A. J. Stevens, *Gen. M. M.* ..... Sacramento, Cal.
Benj. Welch, *Gen. M. C. B.* ..... Sacramento, Cal.
G. J. Tynan, *M. C. B.* ..... Sacramento, Cal.
West'n: Visalia Tulare Divs. and North'n R. R.:
A. D. Wilder, *Supt* ..... W. Oakland, Cal.
G. D. Welch, *M. M.* (W. Div.) W. Oakland, Cal.
W. D. Ludlow, *M. C. B.* (W. Div.) do.
S. J. Johnson, *M. M.* (T. Div.) ... Tulare, Cal.
I. V. Rutherford, *M. M.* (N. Rd.) .8. Vallejo, Cal.
Sacramento; Oregon Divs.; and Cal. Pac. R.:
J. R. Wright, *Supt* ..... Sacramento, Cal.
R. W. Cooley, *M. M.* ..... Sacramento, Cal.
Phil. Douglas, *For. Car Sh.* ..Sacramento, Utah
Truckee Div.: Frank Free, *Supt* Wadsworth, Nev.
Geo. Gregg, *M. M.* ..... Wadsworth, Nev.
Wm. McPherson, *F. Car Sh.* ..Wadsworth, Nev.
Humb't Div.: G. W. Coddington, *Supt.* Carlin, Nev.
H. Smith, *M. M.* ..... Carlin, Nev.
J. C. Doughty, *For. Car Sh.* ..... Carlin, Nev.
Salt Lake Div.: A. G. Fell, *Supt.* ..... Ogden, Utah.
James Hall, *M. M.* ..... Terrace, Utah.
A. Sherburne, *For. Car Sh.* ..... Ogden, Utah.
Los Angeles; and Yuma Divs. (So. Pac.):
E. F. Beach, *Asst. Supt.* ..Los Angeles, Cal.
James Velsh, *M. M.* ..... Los Angeles, Cal.
J. S. Young, *For. Car Sh.* ..... Los Angeles, Cal.
Arizona Div. (So. Pac.):
A. A. Beach, *Asst. Supt* ..... Tucson, Ariz.
Rio Grande and El Paso Divs. (So. Pac.):
J. Campbell, *Ass't Supt.* ..... El Paso, Texas.
H. C. Standish, *For. Car Sh.* ..El Paso, Texas.
Central Vermont R. R. 4-8½ g. 548 m. 132 lo. 2,522 c.
J. W. Hobart, *Gen. Supt* ..... St. Albans, Vt.
J. M. Foss, *Asst. Gen. Supt. & M. M.* St. Albans, Vt
No. Div.: I. B. Futvoye, *Supt.* ..... St. Johns, P. Q.
Rut. Div.: J. Burdett, *Supt* ..... Rutland, Vt.
N. L. Davis, *M. M. & C. B.* ..... Rutland, Vt.
New London & No'n R. R. 143 m. 22 lo. 303 c.
G. W. Bentley, *G. Supt. & P. A.* ..New London, Ct.
I. W. Dow, *M. M.* ..... New London, Ct.
S. O. Banks, *M. C. B.* ..... New London, Ct.

Charleston & Savannah Ry. 5 g. 115 m. 17 lo. 98 c.
H. S. Haines, *Gen. Man.* ..... Savannah, Ga.
C. S. Gadsden, *Gen. Supt* ..... Charleston, S. C.
H. A. Ulmo, *M. M.* ..... Savannah, Ga.
J. D. Murphy, *M. C. B.* ..... Savannah, Ga.
Charlotte, Columbia & Augusta R. R. (*See Rich. & D.*
Chateaugay R. R. 3 g. 34 m. 6 lo. 125 cars.
A. L. Inman, *Gen. Man* ..... Plattsburg, N. Y.
J. M. Davis, *Supt. & M. M.* ..... Plattsburg, N. Y.
Chattarol Ry. 4-8½ g. 43 miles. 11 locs. 450 cars.
C. H. Rockwell, *Gen. Man. & P. A* Ashland, Ky.
J. R. Martin, *M. M.* ..... Ashland, Ky.
Joseph Burley, *M. C. B.* ..... Ashland, Ky.
Cheraw & Chester R. R. 3 g. 30 m. 3 lo. 38 cars.
W. H. Harding, *Pres. & Supt.* ..Chester, S. C.
A. M. Manning, *M. M.* ..... Chester, S. C.
Cheraw & Darlington R. R. ..... (*See Wil. & Wel.*)
Cheraw & Salisbury R. R. ..... (*See Wil. & Wel.*)
Cherokee R. R. 3 g. 37 m. 3 lo. 50 cars.
John Postel, *Manager* ..... Atlanta, Ga.
C. E. Serutan, *M. M. & C. B.* ..Cedartown Ga.
Chesapeake, Ohio & So.-W'n. 5 g. 365 m. 34 lo. 102 c.
R. Meek, *G. S. & Pur. Agt* Elizabethtown, Ky.
W. D. Robb, *M. M.* ..... do.
C. A. Simon, *M. M. & C. B.* ..... Paducah, Ky.
Chesapeake & Ohio Ry. 4-8½ g. 642 m. 133 l. 3,543 c.
C. W. Smith, *Gen. Man.* ..... Richmond, Va.
A. H. Wood, *Asst. to Gen. Man.* ..... do.
A. S. Emmons, *Pur. Agt* ..... Richmond, Va.
John McFarland, *Supt. M. P.* ..... Richmond, Va.
Eastern Div.: E. T. Smith, *Supt.* ..Richmond, Va.
J. N. King, *M. C. B.* ..... Richmond, Va.
Hunt. Div.: W. P. Harris, *Supt.*; and ..... do.
T. L. Chapman, *Asst. Supt. M. P.*; and
H. C. Bassinger, *M. C. B* Huntington, W. Va.
Lex. Div.: J. D. Yarrington, *Supt.* Lexington, Ky.
Chesnire R. R. 4-8½ g. 80 m. 30 lo. 450 cars.
R. Stewart, *Gen. Man.* ..... Keene, N. H.
H. H. Stone, *Pur. Agt* ..... Keene, N. H.
F. A. Perry, *M. M.* ..... Keene, N. H.
A. E. Howard, *G. For. Car Sh.* ..... Keene, N. H.
Chester & Lenoir Ry. 3 g. 50 m. 3 lo. 23 cars.
James Mason, *Supt* ..... Yorkville, S. C.
T. P. Beard, *M. M.* ..... Yorkville, S. C.
Chicago, B. & Kan. City Ry. 4-8½ g. 181 m. 9 lo. 130 c.
J. W. Smith, *Gen. Supt* ..... Gainesburg, Ill.
W. H. Bartlett, *Act. M. M.* ..... Burlington, Ia.
A. B Allen, *M. C. B.* ..... Farmington, Ia.
Chicago, Burlington & Quincy R. R.
4-8½ g. 2,924 m. 441 lo. 16,466 cars.
T. J. Potter, *Gen. Man.* ..... Chicago, Ill.
H. B. Stone, *Supt. Lo. & Car Dept.* ..Chicago, Ill.
G. W. Rhodes, *S. M. P. & M.* ..... Aurora, Ill.
Wm. Forsyth, *Mech. Eng.* ..... Aurora, Ill.
(1) C., B. & Q., East of Mo. Riv. ..... 1,695 miles.
H. B. Stone, *Gen. Supt* ..... Chicago, Ill.
Geo. B. Harris, *Pur. Agt* ..... Chicago, Ill.
Ill. Divs.: J. D. Besler, *Supt* ..... Galesburg, Ill.
Chi. Div.; Geo. Alexander, *Supt.* ..... Aurora, Ill.
L. E. Johnson, *M. M.* ..... Aurora, Ill.
Galesburg Div.: T. C. Rice, *Supt.* Galesburg, Ill.
Robert Colville, *M. M.* ..... Galesburg, Ill.
St. Lou. Div.: S. B. Crance, *Supt.* ..... St. Louis, Mo.
A. Forsyth, *M. M.* ..... Beardstown, Ill.
Ia. & Mo. Divs.: K. H. Wade, *Supt.* ..Burlington, Ia.
East. Div.: C. M. Levy, *Supt.* ..... Burlington, Ia.
Joel West, *M. M.* ..... Burlington, Ia.
Mid. Div.: J. B. Maxon, *Supt* ..... Ottumwa, Ia.
West'n Div.: W. T. Ryder, *Supt.* ..... Creston, Ia.
C. W. Eckerson, *M. M.* ..... Creston, Ia.
(2) C., B. & Q., West of Mo. Riv. ..... 935 miles.
G. W. Holdredge, *Gen. Supt* ..... Omaha, Neb.
Jas. M. Barr, *Pur. Agt* ..... Omaha, Neb.
D. Hawksworth, *Gen. M. M.* Plattsmouth, Neb.
Bur. & Mo. Riv. & Neb. Ry. Divs.:
J. S. Phillippi, *Supt* ..... do.
O. R. Newton, *M. M.* ..... Lincoln, Neb.
R. V. Div.: A. Campbell, *Supt.* ..Hastings, Neb.
A. & N. Div.: J. McConnell, *M.* ..... Lincoln, Neb.
Chicago, Milwaukee & St. Paul R. R.
4-8½ g. 3,951 m. 425 lo. 13,650 cars.
S. S. Merrill, *Gen. Man.* ..... Milwaukee, Wis.
J. T. Clarke, *Gen. Sup't.* ..... Milwaukee, Wis.
J. T. Crocker, *Pur. Agt.* ..... Milwaukee, Wis.
J. M. Lowry, *Gen. M. M.* ..... Milwaukee, Wis.
H. Watkeys, *M. M.* ..... W. Milwaukee, Wis.
John Bailie, *Supt. Car Dept.* ..Milwaukee, Wis.
La Crosse: F. du Chien; Wis. Val.; Chi.; and
Chi. & Pac. Divs.:
B. C. Atkins, *Supt* ..... Milwaukee, Wis.
Northern Div.: L. R. Rock, *Supt.* ..Milwaukee, Wis.
Wm. E. Kittredge, *M. M.* ..... Milwaukee, Wis.
So.-Wn. Divs.: D. A. Olin, *Supt* ..... Racine, Wis.
John Taylor, *M. M.* ..... Racine, Wis.
E. A. Eddy, *M. C. B.* ..... Racine, Wis.
Lines West of Mississippi River:
C. H. Prior, *A. Gen. Supt.* ..Minneapolis, Minn.
H. & D. Div.: C. W. Case, *Supt* Minneapolis, Minn.
J. O. Pattie, *M. M.* ..... Minneapolis, Minn.
Ia. & Minn. Div.: H. R. Williams, *Supt.* ..... do.
So. M. Div.: F. D. Underwood, *Supt.* La Crosse, Wis
Ia. & Da. Div.: G. W. Sanborn, *Supt.* Mason City, Ia.
S. Cy. & Da. Div.: J. Jackson, *Supt* Sioux City, Ia.
F. H. Moulton, *M. M.* ..... Marion, Dak.
M. Pt. Div.: G. W. Cobb, *Supt.* ..Mineral Pt., Wis.
Dubuque Div.: J. H. Jenkins, *Supt.* ..Dubuque, Ia
S. Charnley, *M. M.* ..... Dubuque, Ia.
Chicago, Pekin & So.-W'n. R. R. 4-8½ g. 88 m. 8 lo. 455 c.
A. H. Crocker, *Rec.* ..... Joliet, Ill.
A. H. Cook, *Pur. Agt.* ..... Chicago, Ill.
A. R. Overton, *M. M.* ..... Joliet, Ill.
F. Shields, *M. C. B.* ..... Streator, Ill.
Chicago, Rock Island & Pac. Ry.
4-8½ g. 1,381 m. 290 lo. 17,799 cars.
R. R. Cable, *V. P. & Gen. Man.* ..Chicago, Ill.
A. Kimball, *Gen. Supt* ..... Davenport, Ia.
F. A. Marsh, *Pur. Agt* ..... Chicago, Ill.
T. B. Twombly, *Gen. M. M.* ..... Chicago, Ill.
B. K. Verbryck, *Gen. M. C. B.* ..... Chicago, Ill.
Ill. Div.: R. H. Chamberlin, *Supt.* ..Chicago, Ill.
R. Biester, *M. M.* ..... Chicago, Ill.
Sam'l Pullman, *M. C. B.* ..... Chicago, Ill.
Ia. Div.: H. F. Royce, *Supt* ..... Des Moines, Ia.
J. G. Crockett, *M. M.* ..... Stuart, Ia.
Jas. E. Morrill, *M. C. B.* ..... Davenport, Ia.
Chas. M. Leonard, *M. C. B.* ..... Davenport, Ia.
So.-Wn. Div.: G. F. Walker, *Supt.* ..... Trenton, Ia.
R. A. Carscadin, *M. M.* ..... Trenton, Ia.
Chas. R. Best, *M. C. B.* ..... Trenton, Ia.
K. & Des. M. Div.: Jno. Given, *Supt.* ..Keokuk, Ia.
S. W. Wakefield, *M. M.* ..... Keokuk, Ia.
Henry Kummer, *M. C. B.* ..... Keokuk, Ia.
Chi., Saginaw & Can. R. R. 4-8½ g. 38 m. 4 lo. 16 c.
J. A. Elwell, *Gen. Man. & Pur. Agt.* St. Louis, Mich.
Jas. T. Hall, *Supt* ..... St. Louis, Mich.
Chicago, St. Louis & New Orleans R. R.
4-8½ g. 571 m. 101 lo. 1,913 cars.
J. C. Clarke, *Gen. Pur. Agt. & G. Man.* New Orleans, La.
L. T. Brien, *Asst. Gen. Man.* ..New Orleans, La.
C. M. Sheafe, *Gen. Supt* ..... New Orleans, La.
H. H. Pehlgen, *Pur. Agt* ..... New Orleans, La.
W. H. Purdy, *Supt. Mach.* ..McComb City, Miss.
Geo. W. Baxter, *M. C. B.* ..McComb City, Miss.
So. Div.: F. Ambrose, *Acting Supt* ..... do.
W. P. McKinley, *M. M.* ..... McComb City, Miss.
No. Div.: J. G. Mann, *Supt* ..... Jackson, Tenn.
M. Kelly, *M. M.* ..... Jackson, Tenn.
J. F. White, *M. M.* ..... Water Valley, Miss.
Chicago, St. Paul, Minneapolis & Omaha Ry.
4-8½ g. 1,097 m. 311 lo. 4,686 cars.
C. F. Hatch, *Gen. Supt* ..... St. Paul, Minn.
W. H. S. Wright, *Pur. Agt* ..... St. Paul, Minn.
Matt. Ellis, *M. M.* ..... St. Paul, Minn.
W. R. Rice, *M. C. B* ..... St. Paul, Minn.
Ea. & No. Div.: T. P. Gere, *Supt.* St. Paul, Minn.
St. Paul Div.: J. F. Lindsley, *Supt* St. Paul, Minn.
Sioux City Div.: H. Spencer, *Supt.* Sioux City, Ia.
F. W. Heinsleman, *Gen. For. Sh.* Sioux Cy, Ia.
Neb. Div.: W. Morford, *Supt* ..... Omaha, Neb.
Chicago, Texas & Mexican Central Ry.
4-8½ g. 52 m. 4 lo. 60 cars.
Gen. Supt ..... Dallas, Tex.
Chas. Howard, *Pur. Agt.* ..... Chicago, Ill.
Chicago & Alton R. R. 4-8½ g. 840 m. 213 lo. 6,148 c.
J. C. McMullin, *Gen. Man.* ..... Chicago, Ill.
W. F. Merrill, *Gen. Supt.* ..... do.
A. V. Hartwell, *Pur. Agt.* ..... Chicago, Ill.
Wm. Wilson, *Supt. of Mach.* Bloomington, Ill.
Jos. Townsend, *G. For. Car Dept.* ..... do.

Chi. Div.: A. M. Richards, *Supt.*, Bloomington, Ill.
St. Louis Div.: T. M. Yates, *Supt.* Roodhouse, Ill.
Kan. Cy. Div.: O. Vaughan, *Supt.* ..... Slater, Mo.
Wm. McFall, *M. M.* ..... Slater, Mo.
Chi. & East'n Ill. 4-8½ g. 248 m. 56 lo. 3,000 cars.
O. S. Lyford, *Gen. Supt.* ..... Chicago, Ill.
D. R. Patterson, *Pur. Agt.* ..... Chicago, Ill.
P. W. Drew, *M. Trans.* ..... Chicago, Ill.
Allen Cook, *M. M.* ..... Danville, Ill.
Jas. T. Leary, *M. C. B* ..... Danville, Ill.
**Chicago &

CLIFF BUFFER.
5¼ by 8. 2¼ in. hole.
Capacity, 16,500 lbs.

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CHARLES DEW. GIBSON, PREST. (Limited), EDMUND K. RIGHTER, SECY.
GEORGE B. SLOAN, TREAS. EDWARD CLIFF, SUPERINTENDENT.

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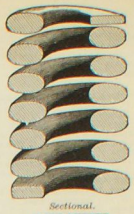
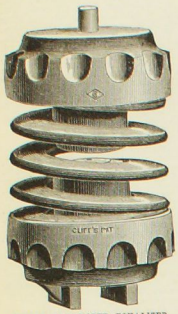
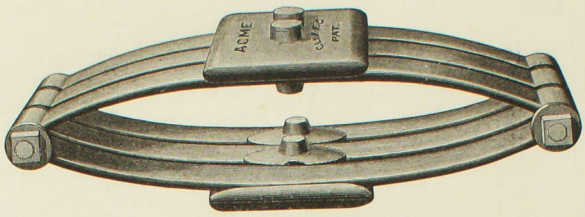


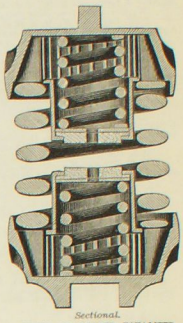
Sectional.
CLIFF BUFFER.
5¼ x 8. 2¼ in. hole.
Capacity, 16,500 lbs.



CLIFF'S GRADUATED EQUALIZER.
7¾ in. diam., 11¼ in. high.
Capacity graduated from 7,000 to 10,000 lbs.



ACME TRIPLET FREIGHT ELLIPTIC.
CLIFF'S PATENT, MARCH 29, 1881.
22 in. long. 6¼ in. bearing to bearing.
Capacity, 28,500 lbs.



Sectional.
CLIFF'S GRADUATED EQUALIZER.
7¾ in. diam., 11¼ in. high.
Capacity graduated from 7,000 to 10,000 lbs.

MORSE BUILDING, NEW YORK.

IN THE PATENT FIGHT

BETWEEN

D. A. HOPKINS, of 113 Liberty Street, N. Y.,

PATENTEE AND MANUFACTURER OF

SELF-FITTING JOURNAL BEARINGS,

AND

T. V. LE ROY,

A SECOND DECISION WAS RENDERED JUNE 7, 1881,

IN FAVOR OF HOPKINS.

The closing paragraphs of said decision read as follows:

"As the proofs stand, therefore, Hopkins was the first to conceive, the first to disclose to others, the first to embody in models, the first to reduce to practice, and the first to apply for a patent. Le Roy was first to obtain a patent, but under circumstances which do not give him the prima facie case which a patent usually implies."

"We must find priority of invention to be with D. A. Hopkins, and affirm the examiner's decision."

H. H. BATES,
R. L. B. CLARKE,
R. G. DYRENFORTH,
Examiners-in-Chief.

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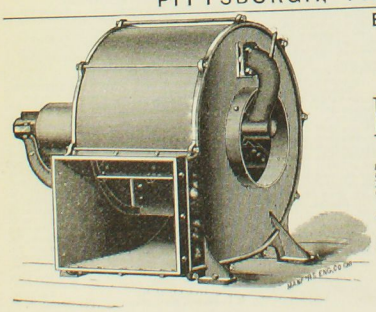

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J. M Davies, *Supt. & M. M.*, Crown Point, N. Y.
J. C. Sherman, *M. C. B.*, Crown Point, N. Y.
Cumberland & Pennsylvania R. R. 4-8½ g. 55 m.
P. L. Burwell, *Gen Supt & P. A.* Cumberland, Md.
N. W. Howson, *Mast. of Mach.* Mt. Savage, Md.
Nathan Bibik, *M. C. B.* Mt. Savage, Md.
Cumberland Valley R. R. 4-9 g. 125 m. 21 lo. 280 cars.
J. F. Boyd, *Supt.* Chambersburg, Pa.
A. S. Hull, *M. M.* Chambersburg, Pa.
C. Wickey, *F. C. R.* Chambersburg, Pa.

D

Danbury & Norwalk R. R. 4-8½ g. 33 m. 6 lo. 100 c.
L. W. Sandiforth, *G. Supt. & P. A.* S. Norwalk, Ct.
N. M. George, *M. M. & C. B.* Danbury, Conn.
Danville, Mocksville & So.-Wn. R. R. 3 g. 28 m.
H. W. Goodrich, *Ch. Eng.* Leaksesville, N. C.
Danville, Olney & O. R. R. R. 4-8½ g. 110 m. 4 lo. 83 c.
C. Howard, *G. Man. & Pur. Agt.* Boston, Mass.
J. M. Graham, *Supt.* Kansas, Ill.
Louis Parisoe, *M. M. & C. B.* Kansas, Ill.
Dayton & Union R. R. *(See Ohio Ry.)*
Delawaare, Lackawanna & Western R. R.
4-8½ g. 670 m. 348 lo. 26,187 cars.
Wm. F. Halstead, *Gen. Supt.* Scranton, Pa.
G. W. B. Cushing, *Pur. Agt.* New York, N. Y.
Walter Dawson, *Mast. of Mach.* Scranton, Pa.
Robt. McKenna, *M. C. B.* Scranton, Pa.
Bloomsb'g Div. : C. Graham, *M. M.*, Kingston, Pa.
Utica Div. : A. C. Salisbury, *Supt.* Utica, N. Y.
Thos. Thatcher, *M. M.* Utica, N. Y.
Morris & Essex Div. and Sussex R. R. :
A. Reasoner, *Supt.* Hoboken, N. J.
W. H. Lewis, *M. M.* Kingsland, N. J.
J. W. Baker, *Mast. Car Rep.* Dover, N. J.
Oswego & Syracuse Div. :
W. B. Phelps, *Supt.* Oswego, N. Y.
Jas. Buchanan, *M. M.* Syracuse, N. Y.
Syracuse, Binghamton & New York R. R.
4-8½ g. 81 m. 30 lo. 508 cars.
W. K. Niver, *Gen. Supt.* Syracuse, N. Y.
Jas. Buchanan, *M. M.* Syracuse, N. Y.
Delaware & Western R. R. 4-8½ g. 20 m. 4 lo. 50 cars.
David Connell, *Supt.* Wilmington, Del.
Delaware & Chesapeake R. R. 4-8½ g. 54 m. 3 lo. 16 c.
S. Sanford, *Supt.* Oxford, Md.
Joseph A. Raynard, *M. M.* Oxford, Md.
Chas. E. Mason, *M. C. B.* Oxford, Md.
Delaware & Hudson Canal Co. 4-8½ g.
Chr. Körner, *M. C. B.* Green Island, N. Y.
Pa. Div. : R. Manville, *Supt & Pur. Agt.* and
S. H. Dotterer, *M. M.* Carbondale, Pa.
T. Orchard, *M. C. B.* Carbondale, Pa.
Denver & Rio Grande Ry. 3 g. 1,062 m. 170 lo. 4,617 c.
D. C. Dodge, *Gen. Man.* Denver, Col.
Henry Wood, *Gen. Supt.* Salt Lake City, Utah.
Geo. W. Ristine, *Asst. Gen. Man.* Denver, Col.
A. B. Garner, *Pur. Agt.* Denver, Col.
N. W. Sample, *M. M.* Denver, Col.
M. C. B. Burnham, Col
1st Div. : W. H. Bancroft, *Supt.* S. Pueblo, Col.
2d Div. : R. M. Ridgway, *Supt.* Alamosa, Col.
3d Div. : Cole Lydon, *Supt.* Leadville, Col.
4th Div. : J. A. Myers, *Supt.* Salida, Col.
Des Moines & Ft. Dodge. 4-8½ g. 87 m. 11 lo. 158 c.
C. N. Gilmore, *Supt.* Des Moines, Ia.
John McGrayel, *M. M.* Grand Junction, Ia.
E. A. Sweetland, *M. C. B.* Grand Junction, Ia.
Det., Gr. H. & Mil. Ry. 4-8½ g. 189 m. 36 lo. 478 c.
G. R. Nash, *Gen. Man.* Detroit, Mich.
John S. Latimer, *Storekeeper.* Detroit, Mich.
W. J. Morgan, *Supt.* Detroit, Mich.
F. Parker, *Mech. Supt.* Detroit, Mich.
Det., Lansing & No'n R. R. 4-8½ g. 222 m. 84 lo. 1,027 c.
John B. Mulliken, *Gen. Man.* Detroit, Mich.
Allan Bourn, *Pur. Agt.* Detroit, Mich.
Thos. M. Fish, *Gen. Supt.* Ionia, Mich.
G. C. Watrous, *M. M. & C. B.* Ionia, Mich.
Det., Mack. & Marq. R. R. 4-8½ g. 151 m. 8 lo. 227 c.
Thos. McKeown, *Gen. Supt.* Marquette, Mich.
E. W. Allen, *Pur. Agt.* Marquette, Mich.
John Wilson, *Mech. Supt.* Marquette, Mich.
Dorchester & Delaware R. R. 4-8½ g. 33 m.
Thos. E. Wright, *Supt.* Cambridge, Md.
Dubuque & Dakota R. R. 4-8½ g. 64 m. 2 lo. 54 cars.
A. C. Goodrich, *Supt.* Waverly, Ia.
W. S. Couch, *Pur. Agt.* Dubuque, Ia.
Duck River Valley R. R. 3 g. 34 m.
Geo. Childress, *Supt.* Columbia, Tenn.
Dunkirk, Allegheny Valley & Pittsburgh R. R.
4-8½ g. 91 m. 14 lo. 102 cars.
D. Thayer, *Gen. Supt.* Dunkirk, N. Y.
R. C. Moore, *Pur. Agt.* New York, N. Y.
J. C. Haggett *M. & C. B.* Dunkirk, N. Y.

E

East Broad Top R. R. 3 g. 30 m. 6 lo. 191 cars.
A. W. Sims, *Supt.* Orbisonia, Pa.
G. A. Haggerty, *M. M.* Orbisonia, Pa.
East Tennessee, Virginia & Georgia R. R.
5 g. 1,185 m. 133 lo. 1,597 cars.
Henry Fink, *Gen. Man.* Lynchburg, Va.
J. F. O'Brien, *Gen. Supt.* Knoxville, Tenn.
Main Stem; Ohio; and No. Car. Divs. :
F. K. Huger, *Supt.* Knoxville, Tenn.
B. J. Sitton, *M. M.* Knoxville, Tenn.
Jos. Armbruster, *M. C. B.* Knoxville, Tenn.
Selma and Alabama Central Divs. :
John M. Bridges, *Supt.* Selma, Ala.
Simon Gay, *M. M.* Selma, Ala.
W. W. Pierce, *M. C. B.* Selma, Ala.
Memphis & Charleston R. R. Div. :
R. B. Pegram, Jr., *Supt.* Memphis, Tenn.
H. N. Burford, *M. M.* Memphis, Tenn.
M. C. B. Memphis, Tenn.
Macon & Brunswick Div. :
J. F. Mallory, *Supt.* Macon, Ga.
G. R. Wanton, *M. M.* Macon, Ga.
Georgia Division:
W. V. McCracken, *Supt.* Atlanta, Ga.
Eastern R. R. 4-8½ g. 90 lo. 2,208 cars.
D. W. Sanborn, *Mast. of Trans.* Boston, Mass.
Geo. J. Fisher, *Pur. Agt.* Boston, Mass.
Amos Pillsbury, *S. M. P. & M.* E. Boston, Mass.
D. Billings, *M. C. B.* Salem, Mass.
Con'y Div. : J. W. Sanborn, *Supt.*, Wolfboro J., N. H.
Eastern Kentucky R. R. 4-8½ g. 34 m. 5 lo. 123 c.
H. W. Bates, *V. P. & Manager.* Greenup, Ky.
Geo. Gibbs, *Pur. Agt.* Riverton, Ky.
S. Weaver, *M. M.* Riverton, Ky.
Eastern Shore R. R. 4-8½ g. 38 m. 2 lo.
W. Thompson, *Supt.* Princess Anne, Md.
F. Strattner, *M. M.* Princess Anne, Md.
Elberton Air Line R. R. *(See Rich. & Dan. Ry.)*
Elizabeth City & Norfolk R. R. 4-8½ g. 70 m. 5 lo. 96 c.
M. K. King, *Gen. Man. & Pur. Agt* Norfolk, Va.
S. Whitworth, *M. M. & C. B.* Norfolk, Va.
Erie & Pittsburgh R. R. *(See Penna. Co.)*
Eureka & Palisade R. R. 3 g. 97 m. 7 lo. 124 cars.
P. Evans, *Gen. Supt & Pur. Agt.* Eureka, Nev.
J. P. Rugg, *M. M.* Palisade, Nev.
A. S. Longley, *M. C. B.* Palisade, Nev.
Europ. & No. Amer. Ry. 4-8½ g. 114 m. 15 lo. 557 c.
F. W. Cram, *Supt. & Pur. Agt.* Bangor, Me.
A. O. Dalley, *M. M. & C. B.* Mattawamkeag, Me.
Evansville, Indiana & Cairo Line. 200 miles.
G. J. Grammer, *Supt.* Evansville, Ind.
Evansville, Rockport & E'n Ry. 4-9 g. 71 m. 5 lo. 98 c.
H. L. Shepard, *Supt.* Evansville, Ind.
Evansv. & Terre Haute. 4-8½ g. 114 m. 26 lo. 900 c.
C. J. Hepburn, *Gen. Supt.* Evansville, Ind.
John Torrence, *Gen. For.* Evansville, Ind.

F

Fitchburg R. R. 4-8½ g. 189 m. 100 lo. 3,315 cars.
John Adams, *Gen. Supt.* Boston, Mass.
E. K. Turner, *Asst. Supt.* Fitchburg, Mass.
F. S. Pratt, *Pur. Agt.* Boston, Mass.
W. A. Foster, *Acting Supt. M. P. & M.*; and
J. W. Marden, *M. C. B.* Charlestown, Mass.

Flint & Pere Marq. 4-8½ g. 318 m. 52 lo. 1,556 cars.
H. C. Potter, *Gen. Man.* E. Saginaw, Mich.
D. Edwards, *Asst. Gen. Man.* E. Saginaw, Mich.
G. G. Cook, *Pur. Agt.* E. Saginaw, Mich.
Sanford Keeler, *Gen. Supt.* E. Saginaw, Mich.
W. F. Potter, *Supt.* (E. Div.). E. Saginaw, Mich.
M. V. Meredith, *Supt.* (W. Div.) E. Saginaw, Mich.
T. J. Hatswell, *M. M.* E. Saginaw, Mich.
D. McPherson, *M. C. B.* E. Saginaw, Mich.
Florida Central & Western R. R.
5 g. 234 m. 10 lo. 160 cars.
Wm. M. Davidson, *Gen. Man.* Jacksonville, Fla.
Jas. S. McElroy, *Supt.* Tallahassee, Fla.
Florida Southern Ry. 3 g. 50 m. 5 lo. 53 cars.
H. S. Haines, *Gen. Supt.* Palatka, Fla.
F. A. Garrison, *Pur. Agt* Palatka, Fla.
J. W. Roberts, *M. M. & C. B.* Palatka, Fla.
Florida Transit R. R. 4-8½ g. 25 m.
D. E. Maxwell, *Gen. Supt.* Fernandina, Fla.
John Hedges, *Pur. Agt.* Fernandina, Fla.
R. V. Dashiell, *M. M.* Fernandina, Fla.
G. Hernandez, *M. C. B.* Fernandina, Fla.
Fonda, Johnst'n & Gloversv. 4-8½ g. 20 m. 5 lo. 18 c.
Lawton Cates, *Supt.* Gloversville, N. Y.
Fond du Lac, Amboy & Peoria. 3 g. 30 m. 2 lo. 35 c.
Alonzo Kinyon, *Supt. & P. A.* Fond du Lac, Wis.
Fort Dodge & Ft. Ridley R'R. 4-8½ g.
G. R. Pearson, *Supt.* Fort Dodge, Ia.
Ft. Madison & No.-West'n Ry. 3 g. 41 m. 4 lo. 120 c.
S. H. Kenick, *Supt. & Pur. Agt.* Ft. Rosadion, Ia.
L. Lamb, *M. M. & C. B.* Ft. Madison, Ia.
Ft. Wayne, Cin. & Louisv. 4-8½ g. 108 m. 9 lo. 240 c.
White Lake Div. : 4-8½ g. 62 m. 5 lo. 170 cars.
W. W. Worthington, *Gen. Supt* Ft. Wayne, Ind.
W. D. Morris, *M. M. & C. B.* Ft. Wayne, Ind.
Ft. Wayne & Jackson. 4-8½ g. 100 m. 10 lo. 353 c.
Gen. Supt. & P. A. Jackson, Mich.
C. W. Hollister *M. M. & C. B.* Jackson, Mich.
Fulton County N. G. Ry. 3 g. 47 m. 3 lo. 106 cars.
A. C. Atherton, *Gen. Supt. & P. Agt.* Lewiston, Ill.

G

Galveston, Harrisburg & San Antonio Ry.
4-8½ g. 492 m. 47 lo. 1870 cars.
Jas. Converse, *Gen. Supt.* Houston, Tex.
Chas. Babbidge, *Pur. Agt.* Boston, Mass.
D. T. Davis, *Supt. M. P. & M.* Harrisburg, Tex.
James Alexander, *M. C. B.* Harrisburg, Tex.
El Paso Div. (*See Cen. Pac.*) 4-8½ g. 144 miles.
Galveston, Houston & Henderson R. R.
4-8½ g. 50 m. 17 lo. 213 cars.
W. H. Harding, *G. Man. & P. Agt.* Galveston, Tex.
Allen McCoy, *Supt.* Galveston, Tex.
J. G. Conlon, *M. M.* Galveston, Tex.
Geneva, Ithaca & Sayre R. R. *(See Lehigh Val.)*
Georgia R. R. 5 g. 307 m. 42 lo. 938 cars.
John W. Green, *Gen. Man.* Augusta, Ga.
John N. Cook, *M. M.* Augusta, Ga.
T. M. Preval, *M. C. B.* Augusta, Ga.
Georgia Pacific Ry. (Miss. Div.) 3 g. 43 m. 2 lo. 44 c.
C. M. Bellon, *Supt.* Greenville, Miss.
W. M. Sutton, *Pur. Agt.* Greenville, Miss.
Benj. Davis, *M. M.* Greenville, Miss.
J. B. Shelton, *M. C. B.* Greenville, Miss.
Grand Haven R. R. *(See Chic. & W. Mich.)*
Grand Junction Ry. *(See Midland of Can.)*
G'd Rap., Newaygo & L. S. R. R. *(See Chic. & W. M.)*
Grand Rapids & Indiana. 4-8½ g. 456 m. 46 lo. 1,566 c.
W. O. Hughart, *Gen. Man.* Grand Rapids, Mich.
W. R. Shelby, *Pur. Agt.* Grand Rapids, Mich.
S. D. Bradley, *M. M.* Grand Rapids, Mich.
No'n Div. : J. M. Metheany, *Supt.* G'nd Rap., Mich.
So'n Div. : P. S. O'Rourke, *Supt.* Fort Wayne, Ind.
Grand Tower & Carbondale. 4-8½ g. 25 m. 6 lo. 357 c.
T. M. Williamson, *Supt. & P. A.* Gr. Tower, Ill.
Hugh Smith, *M. & C. B.* Grand Tower, Ill.
Grand Trunk Ry. 4-8½ g. 1,267 m. 434 lo. 9,403 c.
Joseph Hickson, *Gen. Man.* Montreal, Can.
Wm. Walmsley, *Asst. Gen. Man.* Montreal, Can.
Gr. Tr. Divs. : W. J. Spicer, *Supt.* Montreal, Can.
Jno. Taylor, *Gen. Storekeeper.* Montreal, Can.
Herbert Wells, *Mech. Supt.* Montreal, Can.
Wm. McWood, *M. C. B.* Montreal, Can.
F. R. F. Brown, *Asst. M. S.* Montreal, Can.
J. Davis Barnett, *Gen. Supt.* Fort Wayne, Ind.
Chi. & Gr. Trunk Ry. 4-8½ g. 330 m. 56 lo. 1,191 c.
S. R. Callaway, *Gen. Man.* Chicago, Ill.
W. H. Pettibone, *Supt.* Battle Creek, Mich.
N. Wall, *Pur. Agt.* Fort Gratiot, Mich.
H. Roberts, *Mech. Supt.* Port Huron, Mich.
Great West'n Ry. 4-8½ g. 822 m. 200 lo. 3,000 c.
Chas. Stiff, *Asst. Gen. Man.* Hamilton, Ont.
John Burton, *Supt.* Hamilton, Ont.
E. R. Baines, *Pur. Agt.* Hamilton, Ont.
C. B. Domville, *Loco. Supt.* Hamilton, Ont.
C. F. Hanson, *M. M.* London, Ont.
Henry Childs, *Car Supt.* London, Ont.
Green Bay, Winona & St. Paul R. R.
4-8½ g. 250 m. 19 lo. 506 cars.
Timothy Case, *V. P., Gen. Man.* Green Bay, Wis
James S. Mott, *Pur. Agt.* Green Bay, Wis.
A. Fenwick, *M. M.* Ft. Howard, Wis.
Gulf, Col. & Santa Fé Ry. 4-8½ g. 400 m. 32 lo. 1,000 c.
John Sealy, *Gen. Man.* Galveston, Texas.
F. P. Killeen, *Asst. Gen. Man. & Pur. Agt.* do.
G. R. Nichols, *M. M.* Galveston, Texas.
W. H. Martin, *M. C. B.* Galveston, Texas.
Gulf, W'n Texas & Pac. Ry. 4-8½ g. 68 m. 9 lo. 70 c.
M. D. Monserrate, *Pr. & Supt.* Cuero, Texas.
James Mooney, *M. M.* Cuero, Texas.

H

Halifax & Cape Breton Ry. 4-8½ g. 70 m. 5 lo. 237 c.
H. Abbott, *Manager* New Glasgow, N. S.
Hannibal & St. Jo. R. R. 4-8½ g. 202 m. 70 lo. 1,860 c.
John S. Carson, *Gen. Man.* Hannibal, Mo.
W. R. Woodard, *Supt.* Hannibal, Mo.
T. L. Dunn, *Ch. Eng. & Pur. Agt.* Hannibal, Mo.
Jas. Lange, *Supt. M. P. & Car Dep.* Hannibal, Mo.
Hanover Junction, Hanover & Gettysburg R. R.
4-8½ g. 74 m. 0 lo. 106 cars.
H. D. Scott, *Gen. Supt.* Hanover, Pa.
John J. Bingley *M. M.* Hanover, Pa.
Henry Britcher, *M. C. B.* Hanover, Pa.
Harrisburg, Portsmouth, Mt. Joy & Lancaster R. R. 4-8½ g. 27 m. 2 lo. 7 c.
R. H. Middleton, *Supt.* Bolling Springs, Pa.
Hartford & Conn. Val. R. R. 4-8½ g. 45 m. 7 lo. 196 c.
Samuel Babcock, *Pr. & Supt.* Hartford, Ct.
S. S. Brewer, *M. M.* Hartford, Conn.
Hartford & Conn. W'n R. R. 4-8½ g. 60 m. 10 lo. 235 c.
John F. Jones, *Supt.* Hartford, Ct.
So. & W. R. R. *(See Cin. Ry.)*
Housatonic R. R. 4-8½ g. 126 m. 22 lo. 495 cars.
R. Rigg, *M. M.* Houston, Tex.
Houston & Tex. Cen. Ry. 4-8½ g. 701 m. 75 lo. 3,526 c.
G. Jordan, *V. Pr. & Gen. Man.* Houston, Tex.
A. H. Swanson, *Gen. Supt.* Houston, Tex.
E. S. Marchal, *Pur. Agt.* New York, N. Y.
L. C. Noble, *Gen. M. M.* Houston, Tex.
James McGee, *M. C. B.* Houston, Tex.
So. & W'n Div. : G. Howe, *Supt* Houston, Tex.
No. & Mi. Divs. : G. A. Quinlan, *Supt.*, and
C. H. Burns, *Asst. M. M.* Corsicana, Tex.
No. W'n Div. : Donald Allen, *Supt.* Waco, Tex.
Humeston & Shenandoah R. R.
4-8½ g. 85 m. 5 lo. 72 cars.
F. O. Wyatt, *Gen. Man.* Clarinda, Ia.
M. B. Snyder, *M. M.* Clarinda, Ia.
Huntingdon & Br. Top Mt. 4-8½ g. 62 m. 18 lo. 69 c.
Geo. F. Gage, *Gen. Supt.* Huntingdon, Pa.
Samuel B. Knight, *Pur. Agt.* Philadelphia, Pa.
William Barkla, *M. M.* Saxton, Pa.

I

Illinois Central R. R. 4-8½ g. 1,554 m. 224 lo. 6,172 c.
E. T. Jeffery, *Gen. Supt.* Chicago, Ill.
C. A. Beck, *Asst. Gen. Supt.* Chicago, Ill.
O. Ott, *Pur. Agt.* Chicago, Ill.
Supt. of Mach. Chicago, Ill.
W. B. Snow, *M. M. Car Works.* Chicago, Ill.

Chic. Div. : T. J. Hudson, *Supt* Cairo, Ill.
Henry Schlacks, *M. M.* Chicago, Ill.
Mid. Div. : H. L. Frisbie, *Supt.* Pontiac, Ill.
Spring. Div. : W. Wilkinson, *Supt.* Springfield, Ill.
W. B. McKenna, *M. M.* Clinton, Ill.
No'n Div. : J. C. Jacobs, *Supt.* Amboy, Ill.
J. B. Edams, *M. M.* Amboy, Ill.
So. Div. : David Oxley, *M. M.* Centralia, Ill.
Ia. Div. : D. W. Parker, *Supt.* Dunaque, Ia.
Thos. W. Place, *M. M.* Waterloo, Ia.
Illinois Midland Ry. 4-8½ g. 176 m. 12 lo. 611 cars.
D. H. Conklin, *Rec. & Gen. Man.* Decatur, Ill.
E. D. Frost, *Gen. Supt.* do.
J. G. Clifford, *M. M.* Terre Haute, Ind.
Illinois & St. Louis R. R. 4-8½ g. 18 m. 5 lo. 407 c.
C. H. Sharman, *Gen. Supt. & P. A.* Belleville, Ill.
E. Hockett, *M. M.* Belleville, Ill.
Charles Rotha, *M. C. B.* E. St. Louis Ill.
Indiana, Bloomington & Western Ry.
4-8½ g. 712 m. 64 lo. 3,650 cars.
C. E. Henderson, *Gen. Man.* Indianapolis, Ind.
H. C. Norton, *Pur. Agt.* Indianapolis, Ind.
B. Warren, *Gen. M. M.* Indianapolis, Ind.
Peoria Div. : I. P. Wilson, *Supt.* Indianapolis, Ind.
E. Hiserodt, *M. M.* Urbana, Ill.
St. Louis Div. : I. H. Wilson, *Supt.* Indnpls, Ind.
John King, *M. M.* Indianapolis, Ind.
Ohio Div. : C. T. Tyler, *Supt.* Sandusky, O.
Jos. S. Porter, *M. M.* Sandusky, O.
Indiana, Illinois & Iowa R. R. 42 miles.
F. M. Drake, *Gen. Man.* Dwight, Ill.
J. P. Shouts, *Supt.* Dwight, Ill.
Ind'p'lis & St. Louis R. R. 206 m. 56 lo. 3,276 c.
C. C. Gale, *Gen. Supt.* Indianapolis, Ind.
J. L. Yale, *Pur. Agt.* Cleveland, O.
T. W. Hanson, *M. M. & C. B.* Mattoon, Ill.
Indianapolis & Vincennes R. R. *(See Penna. Co.)*
Intercolonial Ry. 4-8½ g. 846 m. 111 lo. 3,223 cars.
David Pottinger, *Chief Supt.* Moncton, N. B.
T. V. Cooke, *Gen. Storekeeper.* Moncton, N. B.
H. A. Whitney, *Mech. Supt.* Moncton, N. B.
Ewd. Shaffer, *M. C. B.* Moncton, N. B.
Monc. Div. : James E. Price, *Supt.* Moncton, N. B.
Hal. & St. J. Div. : Jas. Coleman, *Supt.* Truro, N. S.
No'n Div. : M. Busby, *Supt.* Campbellton, N. B.
Levis Div. : M. McDonald, *Supt.* Rivière du Loup, Q.
International Ry. 4-8½ g. 69 m. 2 lo. 12 cars.
D. E. McFee, *Supt.* Sherbrooke, Que.
International & Gt. N'n R. R. *(See St. L., I. M. & S.)*
Iron Mountain & Helena R. R. 4-8½ g. 27 m. 2 lo. 1 c.
Wm. Bailey, *Pres. & Gen. Man.* Helena, Ark.
D. Stillinger, *Supt.* Helena, Ark.
F. M. Green, *Pur. Agt.* Helena, Ark.
Wm. Summers, *M. C. B.* Helena, Ark.
Ithaca, Auburn & Western R. R. 4-8½ g. 38 m.
Fred T. Peet, *Supt.* Auburn, N. Y.
Ira Dunning, *M. M.* Auburn, N. Y.

J

Jacksonville So.-E'n R. R. 4-8½ g. 54 m. 5 lo. 68 c.
E. S. Greenleaf, *Supt.* Jacksonville, Ill.
Ira Petrie, *M. M.* Jacksonville, Ill.
Jacksonv., Pensacola & Mob. *(See Fla. Ce-t. & W.)*
Jamesville & Washington. 4-8½ g. 22 m. 3 lo. 24 c.
A. Fisher, *Manager.* Dymond Depot, N. C.
J. E. Lordley, *M. M. & C. B.* Dymond City, N. C.
Jeffersonv'l, Madison & Indpls. R. R. *(See Pa. Co.)*
Jersey City & Albany R. R. 4-8½ g. 38 m.
J. W. McCulloh, *Manager* Jersey City, N. J.
Junction & Breakwater; Breakwater & Frankford; and Worcester R. R. 4-8½ g. 101 m. 20 lo. 313 c.
J. & B. Rd.: Thos. Groome, *Supt.* Lewes, Del.
Geo. Messick, *M. M.* Lewes, Del.
W. H. Virdin, *M. C. B.* Lewes, Del.
B. & F. and W. Rds.: J. L. Mapes, *St* Berlin, Md.

K

Kansas Central R. R. *(See Union Pacific.)*
Kansas City, Lawrence & So. Kansas.
C. C. Wheeler, *Gen. Man.* Topeka, Kan.
J. L. Bittenbender, *Supt.* Lawrence, Kan.
T. D. Volk, *M. M.* Ottawa, Kan.
Kansas City, Fort Scott & Gulf R. R. 4-8½ g.
Geo. H. Nettleton, *Gen. Man.* Kansas City, Mo.
L. W. Towne, *Gen. Supt.* Kansas City, Mo.
H. P. Jacques, *Pur. Agt.* Kansas City, Mo.
J. L. Bacon, *Supt.* Kansas City, Mo.
J. S. McCrum, *M. M.* Kansas City, Mo.
A. N. Montier, *M. C. B.* Kansas City, Mo.
Kansas City, Wyandotte & Council Bluffs R. R.
Des Moines R. Rs. 4-8½ g. 308m. 38 lo. 1,148 cars.
J. F. Barnard, *Gen. Supt. & P. A.* St. Joseph, Mo.
F. A. Chase, *M. M.* St. Joseph, Mo.
Thos. Aylesbury, *M. C. B.* St. Joseph, Mo.
Kendall & Eldred R. R. *(See Olean, B. & W.)*
Kent Co.: Sm. & Del. Bay Rds. 4-8½ g. 50 m. 2 lo. 13 c.
Fred Gerker, *Gen. Man.* Chestertown, Md.
Kentucky Central R. R. 4-9 g. 150 m. 19 lo. 371 cars.
G. W. Bentley, *Supt.* Covington, Ky.
A. N. Watts, *F. of M.* Covington, Ky.
J. L. Hackathorn, *M. C. B.* Covington, Ky.
Kentucky & South Atlantic Ry. 3 g. 25 m. 3 lo. 52 c.
Geo. B. Harper, *Supt. & P. A.* Mt. Sterling, Ky.
S. P. Hatfield, *M. M.* Mt. Sterling, Ky.
Kinzua R. R. *(See Olean, B. & W.)*
Kingston & Pembroke Ry. 4-8½ g. 65 m. 4 lo. 276 c.
B. W. Folger, *Supt.* Kingston, Ont.
Wm. Harty, *Pur. Agt.* Kingston, Ont.
Geo. Becker, *M. M.* Kingston, Ont.
Knox & Lincoln R. R. 4-8½ g. 49 m. 5 lo. 95 cars.
C. A. Coombs, *Supt.* Bath, Me.
Wm. A. Field, *M. M.* Bath, Me.
C. L. Turner, *M. C. B.* Bath, Me.
Knoxville & Augusta R. R. 4-8½ g. 16 m. 2 lo. 34 cars.
J. M. Hood, *Supt.* Marysville, Tenn.
M. R. Hood, *Pur. Agt.* Marysville, Tenn.

L

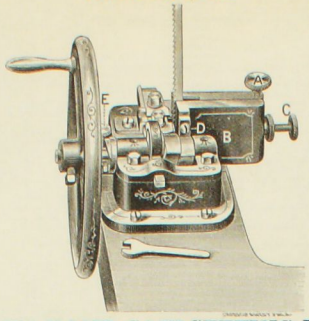
Lake Erie & Western Ry. 4-8½ g. 362 m. 35 l. 1,526 c.
E. H. Waldron, *M. M.* La Fayette Ind.
E. H. Andress, *Pur. Agt.* La Fayette Ind.
H. L. Cooper, *Supt. of Equipment.* Lima, O.
Sandusky Div. : D. S. Hill, *Supt.* Fostoria, O.
Bloom. Div. : *Supt.* La Fayette, Ind.
Lake Shore & Michigan So'n Ry.
4-8½ g. 1,253 m. 537 lo. 16,018 cars.
John Newell, *Gen. Man.* Chicago, Il
P. P. Wright. *Gen. Supt.* Cleveland, O
A. C. Armstrong, *Pur. Agt.* Cleveland, O
James Sedgley, *Gen. M. M.* Cleveland, O.
John Kirby, *Gen. M. C. B.* Cleveland, O.
Buffalo Div. : C. B. Leach, *Supt.* Cleveland, O.
J. S. Graham, *M. M.* Buffalo, N. Y.
A. C. Robson, *M. C. B.* Buffalo, N. Y.
Franklin Div. : G. H. Hulbert, *Supt.* Meadville, Pa.
Erie Div. : C. B. Couch, *Supt.* Cleveland, O.
L. O. Gassett, *M. M.* Cleveland, O.
J. Withycomb, *M. C. B.* Cleveland, O.
Toledo Div. : Thos. Flesher, Jr., *Supt.* Cleveland, O.
J. M. Sanborn, *M. M.* Norwalk, O.
W. O. Smith, *M. C. B.* Norwalk, O.
Mich. Div. : J. E. Curtis, *Supt.* Toledo, O.
Det. Div. : T. J. Charlesworth, *Supt.* Detroit, Mich.
Lansing Div. : H. Huntoon, *Supt.* Lansing, Mich.
Western Div. : J. H. Parsons, *Supt.* Chicago, Ill.
G. W. Stevens, *M. M.* (M. S. Divs.) Elkhart, Ind.
Frank O. Bro, *M. C. B.* Adrian, Mich.
Lebanon Springs R. R. 4-8½ g.
W. C. Alstyne, *Manager* . . . Albany, N. Y.
W. K. Hotaling, *Pur. Agt* Albany, N. Y.
Geo. Tefft, *M. M.* Chatham, N. Y.
Lehigh Valley R. R. 4-8½ g. 545 m. 321 lo. 33,817 c.
Robt. H. Sayre, *Gen. Supt.* Bethlehem, Pa
H. S. Goodwin, *Asst. Gen. Supt.* Bethlehem, Pa
L. Chamberlain, *Pur. Agt.* Philadelphia, Pa.
John S. Lentz, *M. C. B.* Packerton, Pa.
N. J. Div. : H. E. Packer, *Supt.* New York, N. Y.
John I. Kinsey, *M. M.* So. Easton, Pa.
Coal Rds. : J. I. Blakeslee, *Supt.* Mauch Chunk, Pa.
P. Hofecker, *M. M.* Weatherly, Pa.
John Campbell, *M. M.* Delano, Pa.
B. M. Div. : A. G. Brodhead, *S.* Mauch Chunk, Pa.
D. Clark, *M. M.* Hazleton, Pa.
Wy. Div. : A. Mitchell, *S. & M. M.* Wilkesbarre, Pa.
Pa. & N. Y. ; and Geneva, Ithaca & Sayre R. Rs.
Wm. Stevenson, *Supt* Sayre, Pa.
J. N. Weaver, *M. M.* Waverley, Pa.

Ligonier Valley R. R. 3 g. 11 m. 2 lo. 22 cars.
Thos. A. Mellon, *Gen. Manager...* Pittsburg, Pa.
Geo. Lauft, *Supt. & P. Agt* Latrobe, Pa.
Little Rock, Miss. River & Texas Ry.
4-8½ g. 160 m. 12 lo. 260 cars.
J. A. Woolson, *G. S. & P. A.* Little Rock, Ark.
F. Hufsmith, *M. M. & C. B.* Arkansas City, Ark.
Little Rock & Fort Smith. 4-8½ g. 168 m. 12 lo. 353 c.
T. Hartman, *Gen. Supt.* Little Rock, Ark.
James Eblin, *M. M.* Argenta, Ark.
James Malone, *M. C. B.* Argenta, Ark.
Long Island R. R. 4-8½ g. 325 m. 79 lo. 740 cars.
I. D. Barton, *Supt.* Long Island City, N. Y.
Benj. Norton, *Pur. Agt.* Long Island City, N. Y
C. A. Thompson, *M. M. & C. B.* do.
Louisville, New Albany & Chicago Ry.
4-8½ g. 380 miles 33 lo. 2,800 cars.
John MacLeod, *Gen. Supt.* Louisville, Ky.
H. O. Nourse, *Pur. Agt.* Louisville, Ky.
Josiah Bettis, *M. M. & C. B.* New Albany, Ind.
Louis. & Nash. & St. L. Ry. 4-8½ g. 354 m. 34 lo. 691 c.
Webster Snyder, *Gen. Man.* Louisville, Ky.
R. G. Butler, *Gen. Supt.* Louisville, Ky.
W. H. Field, *Pur. Agt.* Louisville, Ky.
F. M. Mast, *M. M.* Evansville, Ind.
Louisville & Nashville R. R.
5 g. 2,072 m. 316 lo. 6,131 cars.
Fred. de Funiak, *Gen Man* Louisville, Ky.
G. C. Breed, *A. Gen. Man & Pur. Agt.* do.
D. W. Moreland, *Supt. Trans.* do.
Reuben Wells, *Supt. Mach.* Louisville, Ky
Louisv. Divs. : and Louisv. Cin. & Lex Ry. (Cin. Div.)
J. G. Metcalf, *Supt.* Louisville, Ky.
P. Leeds, *M. M.* (Lo. Div.) Louisville, Ky.
J. W. Luttrell, *M. M.* (Cin. Div.) Louisville, Ky.
W. P. Pike, *M.* (2d & C. Div.) Howard Green Ky.
Nash. & D. Div. : J. Geddes, *Supt.* Nashville, Tenn.
W. H. Thomas, *M. M.* Nashville, Tenn.
S. & A. L. Div. : E. Marsh, *Supt.* Birmingham, Ala.
C. W. White, *M. M.* Birmingham, Ala.
Mob. & M. : N. Div. Pens. & Sel. ; Sl. & Mont. R. Rs. :
M. S. Belknap, *Supt.* Montgomery, Ala.
J. N. Hall, *M. M.* (Mont. Shops) Montgomery, Ala.
N. O. Liv. : J. T. Harrihan, *Supt.* New Orleans, La.
Wm. O. Adair, *M. M.* Mobile, Ala.
Memp. Div. : W. Colcamp, *Supt.* Memphis, Tenn.
J. V. Slusser, *M. M.* Memphis, Tenn.
St. L. Div. : J. Montgomery, *Supt.* Evansville, Ind.
Thos. Walsh, *M. M.* Mt. Vernon, Ill.
Pensacola and So. Div. Pens. & Selma Rds. :
R. B. Rand, *Supt.* Pensacola, Fla.
Louisville & Wadley R. R. 3 g. 10 m.
J. H. Wilkins, *Pr. & Supt.* Louisville, Ga.

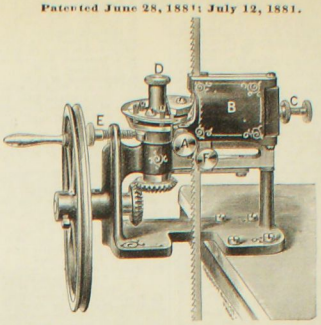
M

Maine Central R. R. 4-8½ g. 355 m. 58 lo. 1,335 c.
Payson Tucker, *Supt.* Portland, Me.
Ira K. Russell, *Vor. Mach. Sh.* Waterville, Me.
C. H. Kenison, *For. Car Sh.* Augusta, Me.
Manchester & Keene R. R. *(See B. L. & C.)*
B. F. George, *Asst. Supt.* Keene, N. H.
Manhattan Ry. 4-8½ g. 52 m. 203 lo. 586 pass. c.
Frank K. Hain, *Gen. Man.* New York, N. Y.
James Tobin, *Pur. Agt.* New York, N. Y.
C. L. Green, *Supt.* New York, N. Y.
T. W. Peeples, *M. M.* New York, N. Y.
H. A. Webster, *M. C. B.* New York, N. Y.
Marietta & Cin. R. R. 4-8½ g. 312 m. 65 lo. 1,622 c.
Jas. H. Stewart, *Supt.* Cincinnati, O.
Edw. Evans, *M. M.* Chillicothe, O.
Marietta & North Georgia R. R. 3 g. 24 m. 1 lo. 5 c.
J. B. Glover, *Supt. & P. Agt.* Marietta, Ga.
E. A. Withers, *M. M.* Marietta, Ga.
Marquette, Houghton & Ontonagon R. R.
4-8½ g. 87 m. 30 lo. 2,074 cars.
Samuel Schoch, *Gen. Man.* Marquette, Mich.
M. B. Wetter, *Pur

Patented May 2, 1882.



Patented June 28, 1881; July 12, 1881.



AMESBURY'S BAND SAW SETTING MACHINE.

Will Set Saws from ⅛ Inch to 2 Inches Wide Accurately at the Rate of 300 Teeth per Minute.

This engraving represents our new Band Saw Setting Machine. It is designed and constructed upon entirely new principles, and embodies all the good features of hand-work in combination with the speed and regularity of machine-work. The users of band saws have long felt the need of a machine that would hold a narrow saw in a rigid position and set the teeth without straining the blade; and in response to inquiries from many of our leading manufacturers, we have perfected a machine that will set the teeth on any band saw without in any manner affecting the blade. It is arranged to work by an easy, uniform crank motion, and when the tooth to be set is fed into position, the blade is firmly locked between the steel jaws of a vise, and remains immovable while the tooth is set to any degree required. As the crank goes forward, the blade is released, when the next tooth is fed up to the dies, the blade again locked in vise, and this tooth set in the opposite direction. All these movements are automatic, and can be carried on at a speed of 300 teeth per minute. The feeder picks up *only the tooth that is to be set*, consequently each tooth is fed to its proper position, *regardless of their irregularity*. No further expense is required outside of the machine, as the band saw is simply hung up over the machine on a wooden bracket, and the lower part left pendent near the floor. **Price, $25.** Send for Circulars and Testimonials.

AMESBURY'S BAND SAW FILING MACHINE.

Will Save Its Cost in a Few Weeks.

Any boy that can turn a crank can file a band saw in from five to ten minutes, more accurately than an expert filer can do the same by hand in one hour. Keeps the teeth even and level, and enables the saw to do more and better work with much less strain. Pronounced by users to be the best labor-saving machine ever introduced.

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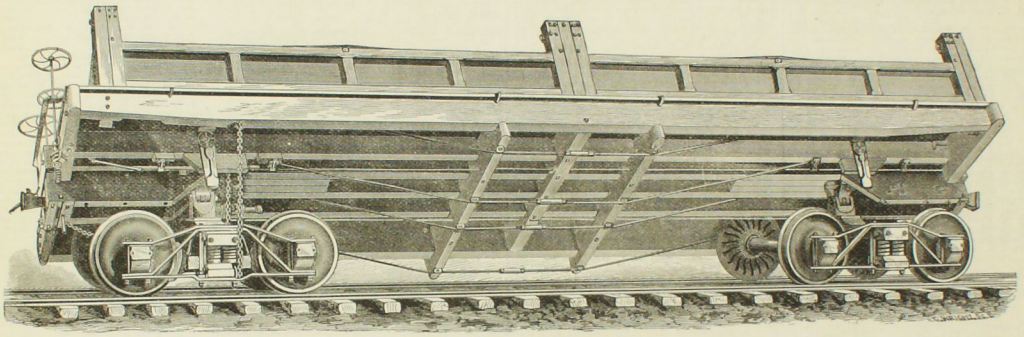
Is sold at a price within the reach of every one using a band saw. *Reduced Price List.*—Net price, including 20 files, $32; thin, corner and facing files, per dozen, $1.20; thick beveled files, per dozen, $1.80 Terms strictly cash.

Send for Catalogue and Testimonials.

G. W. AMESBURY & CO., 3,101 and 3,103 Chestnut Street, Philadelphia, Pa.

THE U. S. CAR CO.'S SCREW LEVER DUMP AND COAL CAR.

SIMEON BROWNELL, President and General Manager. FRANK BROWNELL, Treasurer. M. VAN WORMER, Superintendent.



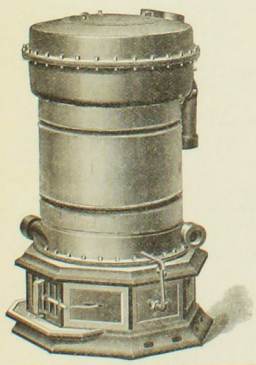
(M. VAN WORMER PATENTS.)

This car has a capacity of eighteen to twenty tons, and can be handled by one man, discharging its load instantly. The device can be applied to flat and grain cars. The car is under perfect control at all times, and can be held at any elevation or dumped suddenly if desired. For construction trains, cars with this device would be invaluable. The mechanism is strong, simple and durable. The following railroads and car-builders are building cars with this screw lever attachment, viz.:

Union Pacific Railway Co.
Lehigh Valley Railroad.
Main Central Railroad Co.
Billmeyer & Small Co., York, Pa.
Northern Pacific Railroad Co.
Joliet Steel Co., of Chicago.
Columbus, Hocking Valley & Toledo Railway.
Wells & French Car Co., Chicago.
Cleveland Rolling Mills Co., Cleveland.
John L. Gill, Jr., Car Co., Pittsburgh.
Rock Island & Mercer County Railroad.
Ontario Car Co., London, Ontario Canada.

UNITED STATES CAR COMPANY, 48 CONGRESS STREET, BOSTON, MASS.

THE SALMON CAR HEATER



"36 per cent. of coal saved and the car kept noticeably warmer!" by using THE SALMON CAR HEATER.

It Insures Safety from Fire in case of Accident, Economy in Fuel and RAPID CIRCULATION.

It heats quickly, is SELF-REGULATING, and can be used for either STEAM OR HOT WATER.

The Water Tubes do not come in contact with the Coals, but occupy the Smoke Flue in such a manner as to absorb the greatest amount of heat from Coal in a low state of combustion without danger of chilling the fire.

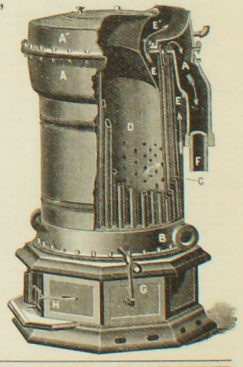
Once filled with coal the fire will last from 24 to 60 hours, according to weather, without replenishing, as proved by actual test.

At the last "Mechanics' Fair" it received the Silver Medal, being the highest award to heaters of any kind.

CORRESPONDENCE SOLICITED.

THE SALMON HEATER CO.,

OFFICE, 35 CONGRESS STREET, BOSTON, MASS.



IRON CITY SCRAP METAL CO.,

DEALERS IN

RAILWAY SUPPLIES, PIG IRON, BLOOMS & ORE,

Old Rails, Scrap Iron, Steel, Etc.,

229 SECOND AVENUE, PITTSBURGH, PA.

MANGANESE BRONZE.

The best wearing metal for Locomotives and Car Axle Bearings now in use. It is as near Anti-Friction as metal can be made, while it retains all the strength of the Strongest Bronze. It is especially adapted to the use of Railroad Companies, Car and Locomotive Builders and Machinists.

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JOHN FITZSIMMONS, Brassfounder 23 Carson St., Pittsburgh, Pa.

Ks. & Tex. Div.: J. M. Eudy, *Supt.* ....Sedalia, Mo.
J. C. Barker, *Asst Supt. Car Dep.*Sedalia, Mo.
Wm. T. Small, *M. M.* .....Parsons, Kan.
Dallas, Ex. & L. R. Keller, *Supt.* ....Dallas, Tex.
Gen. Div.: W. W. Fagan, *Supt* Atchison, Kan.
H. V. Faries, *M. M.* .....Atchison, Kan.
S. Irwin, *Asst. Supt. Car Dep.*Atchison, Kan.
Mobile & Ala. Grand Trunk R. R. 5 g. 59 m. 2 lo. 23 c.
Wm. H. Pratt, *Trustee*.....Mobile, Ala.
Mobile & Girard R. R. ..... 5 g. 84 m. 5 lo. 80 cars.
W. L. Clark, *Gen Supt*.....Columbus, Ga.
J. C. Albrecht, *M. M.*.....Columbus, Ga.
J. J. Nix, *M. C. B.*.....Columbus, Ga.
Mobile & Ohio R. R. 5 g. 528 m. 75 lo. 1,180 cars.
A. L. Rives, *V. Pr. & Gen. Man.*....Mobile, Ala.
R. H. Briggs, *Gen. M. M.*.....Whistler, Ala.
J. T. Booth, *M. C. B.*.....Whistler, Ala.
So'n Div.; I. G. Motley, *Supt.*.....Mobile, Ala.
John Fitzgerald, *M. M.*.....Macon, Miss.
No'n Div.: E. S. Horsford, *Supt.* Jackson, Tenn.
M. T. Carson, *M. M.*.....Jackson, Tenn.
Mobile & Spring Hill R. R. ..... 5 g. 8 m. 0 lo. 80 cars.
F. Ingate, *Supt*.....Mobile, Ala.
Mont Alto R. R. ..... 4-9 g. 21 m. 2 lo. 3 cars.
G. B. Westling, *Supt. & M. M.*.....Mont Alto, Pa.
Montpelier & Wells Riv. R. R. 4-8½ g. 38 m. 3 lo. 76c.
Supt......Montpelier, Vt.
Morgan's Louisiana & Tex. R. R. ..... 4-8½ g. 165 m.
G. Pandeley, *Supt.*.....New Orleans, La.
C. Trumpy, *Pur. Agt.*.....New Orleans, La.
N. Tilton, *M. M.*.....Algiers, La.
Wm. O'Brien, *M. C. B.*.....Algiers, La.
Muncy Creek Ry. ..... 4-8½ g. 10 m.
Benj. G. Welch. *Rec. & P. Agt* Hughesville, Pa.
J. V. Chamberlain, *Supt. & M. M.* ..... do.

N

Nashville, Chattanooga & St. Louis R'y.,
5 g. 508 miles 87 lo. 1,521 cars.
F. de Funiak, *Gen. Man.*.....Louisville, Ky.
J. W. Thomas, *G. Supt. & P. Agt.*Nashville, Tenn.
M. J. C. Wrenne, *Supt.*.....Nashville, Tenn.
James Cullen, *M. M.*.....Nashville, Tenn.
J. G. Sawyer, *M. C. B.*.....Nashville, Tenn.
Natchez, Jackson & Col. R. R. 3-6 g. 60 m. 4 lo. 32 c.
Helton Mickel, *Supt.*.....Natchez, Miss.
Naugatuck R. R. ..... 4-8½ g. 61 miles, 12 lo. 334 cars.
Geo. W. Beach, *Supt*.....Waterbury, Ct.
Henry Hanford, *M. M.*.....Bridgeport, Ct.
Geo. W. Gray, *M. C. B.*.....Bridgeport, Ct.
Nevada Central R. R. .....(*See Union Pac.*)
Nevada County N. G. R. R. 3 g. 23 m. 3 lo. 46 cars.
John F. Kidder, *Supt.*.....Nevada City, Cal.
Jas. McCormick, *M. M. & C. B.*Grass Valley, Cal.
New Brunswick Ry. ..... 4-8½ g. 194 m. 12 lo. 266 cars.
E. R. Burpee, *Supt.*.....Gibson, N. B.
Alfred Seely, *Pur. Agt*.....Gibson, N. B.
Jesse Mathews, *M. M.*.....Gibson, N. B.
T. N. Burpee, *M. C. B.*.....Gibson, N. B.
New Brunswick & Can. Ry. 4-8½ g. 127 m. 12 lo. 184c.
Henry Osborn, *G. M. & P. A.* St. Andrew's, N. B.
John Stewart, *Supt.*.....St. Stephen, N. B.
Thos. Armstrong, *M. M.*.....St. Andrew's, N. B.
G. Houlton, *M. C. B.*.....St. Andrew's, N. B.
New Castle & Oil City R. R. 4-9 g. 38 m. 2 lo. 30 cars.
A. Vandiwort, *Supt.*.....New Castle, Pa.
New Haven & Derby R. R. 4-8½ g. 13 m. 3 lo. 58 c.
John Sinnard, *Supt.*.....New Haven, Conn.
J. M. Whitlock, *M. M. & B.*.....New Haven, Conn.
New Haven & No'mpton. 4-8½ g. 135 m. 20 lo. 572 c.
C. A. Goodnow, *Supt.*.....New Haven, Ct.
C. N. Yeamans, *Pur. Agt*.....New Haven, Ct.
Henry Fox, *M. M.*.....New Haven, Ct.
John Sweeny, *M. C. B.*.....New Haven, Ct.
New Jersey & New York Ry. 6 g. 43 m. 6 lo. 41 c.
J. D. Hasbrouck, *Gen. Man* Jersey City, N. J.
J. S. Drake, *Asst. M. M.*.....Hillsdale, N. Y.
L. B. Van Wagonen, *M. C. B.*.....Hillsdale, N. J.
New Jersey Southern Ry. .....(*See Central, N. J.*)
New London Northern R. R. .....(*See Central Pac.*)
New Orleans Pacific Ry. 5 g. 85 m. 10 lo. 206 cars.
H. S. Moss, *Supt.*.....New Orleans, La.
E. R. Smith, *M. M. & C. B.*.....New Orleans, La.
N. Y. Central & Hudson River R.R.
4-8½ g. 962 m. 676 lo. 22 539 cars.
J. M. Toucey, *Gen. Supt.*.....New York, N. Y.
R. C. Moore, *Pur. Agt*.....New York, N. Y.
Wm. Buchanan, *Supt. M. P.*.....New York, N. Y.
Amos Gould, *Asst. Supt. M. P.*.....New York, N. Y.
L. Garey, *Supt. Car Dept.*.....New York, N. Y.
N. Y. & Har. Div.: C. M. Bissell, *Supt.* do.
P. McG Gibson, *M. M.*.....New York, N. Y.
C. E. Garey, *M. C. B.*.....Morrisania, N. Y.
Hud. Riv. Div.: C. M. Bissell, *Supt.*N. York, N. Y.
Peter Smith, *M. C. B.*.....New York, N. Y.
E'n Div.: Zenas C. Priest, *Supt*.....Utica, N. Y.
G. B. Van Vorst, *M. M.*.....West Albany, N. Y.
D. Holt, *M. C. B.*.....West Albany, N. Y.
W'n Div.: Geo. H. Burrows, *Supt*.Rochester, N. Y.
S. L. White, *M. M.*.....Syracuse, N. Y.
E. A. Olmstead, *M. C. B.*.....E. Buffalo, N. Y.
C. H. Burchard, *M. C. B.*.....E. Rochester, N. Y.
Ed. Donahy, *M. C. B.*.....Niagara Falls, N. Y.
N. Y. Chic. & St. L. Ry. 4-8½ g. 269 m. 36 lo. 1,063c.
L. Williams, *Gen. Man.*.....Cleveland, O.
Gen. Supt......Cleveland, O.
E. E. Dwight, *Supt*.....Cleveland, O.
Ross Kells, *S. M. P. & M.*.....Cleveland, O.
Eas'n Div.: Wallace McGrath, *Supt.*.....Erie, Pa.
Mid. Div.: C. H. Corry, *Supt.*.....Fostoria, O.
West'n Div.: M. E. Wattles, *Supt*.....Chicago, Ill.
New York City & Northern. 4-8½ g. 52 m. 7 lo. 91 c.
F. S. Gannon, *Gen. Supt.*.....High Bridge, N. Y.
M. McNally, *M. of M.*.....High Bridge N. Y.
New York, Lake Erie & Western R. R.
4-8½ g. 1,020 m. 544 loco. 24,400 cars.
Robt. Harris, *V. Pr. & Gen. Man.*.....New York, N. Y.
E. S. Bowen, *Gen. Supt.*.....New York, N. Y.
J. A. Hardenburg, *Pur. Agt*.....New York, N. Y.
F. M. Wilder, *Supt. M. P. & M.*.....Rochester, N. Y.
E'n Div.; E. O. Hill, *Supt.*.....Jersey City, N. J.
J. H. Vreeland, *M. M.*.....Jersey City, N. J.
J. N. Milham, *M. C. B.*.....Jersey City, N. J.
Del. Div.: W. J. Murphy *Supt.* Port Jervis, N. Y.
J. Van Vechten, *M. M. & C. B.*Port Jervis, N. Y.
Susq. Div.: R. B. Cable, *Supt.*.....Elmira, N. Y.
V. Blackburn, *M. M.*.....Susquehanna, Pa.
D. B. Goodell, *M. C. B.*.....Elmira, N. Y.
Buf. & St. Div.: Chas. Neilson, *Supt.*.....Buffalo, N. Y.
G. B. Ross, *M. M.*.....Buffalo, N. Y.
M. Wilder, *M. C. B.*.....Buffalo, N. Y.
B. & S.-W. Div.: C. A. Brunn, *Supt*.....Salamanca, N. Y.
W'n Div.: W. B. Coffin, *Supt.*.Hornellsville, N. Y.
M. Gunn, *M. M.*.....Hornellsville, N. Y.
New York, New Haven & Hartford R. R.
4-8½ g. 293 m. 102 lo. 2,416 cars.
E. M. Reed, *V. P. & Gen. Man.*.New Haven, Ct.
R. N. Dowd, *Pur. Agt*.....New Haven, Ct.
N. Y. & N. H. Div.; J. T. Moody, *Supt.*New York.
Shore Div.: W. H. Stevenson, *Supt.*N. Haven, Ct.
H. Ketteridge, *Asst. Supt. M. P.*..New Haven, Ct.
Jas. Denver, *M. C. B.*.....New Haven, Ct.
Hart. Div.: C. S. Davidson, *Supt.*.....Hartford, Ct.
John Henry, Jr., *Supt. M. P. & M. C. B.*.... do.
New York, Ontario & Western Ry.
4-8½ g. 345 m. 70 lo. 1,539 cars.
Jas. E. Childs, *Gen. Supt.*..Middletown, N. Y.
I. W. Fowler, *Pur. Agt*.....Middletown, N. Y.
Edw. Minshull, *M. M. & C. B.*Middletown, N. Y.
Mid. Div.: N. B. Hankins, *Supt.*Middletown, N. Y.
No'n Div.: C. W. Lanpher, *Supt.*...Norwich, N. Y.
New York, Pennsylvania & Ohio R. R.
4-8½ g. 364 m. 215 lo. 7,387 cars.
J. M. Ferris, *Gen. Man.*.....Cleveland, Ohio.
J. H. Hoiway, *Pur. Agt.*.....Cleveland, Ohio.
Wm. Fuller, *Gen. M. M. & C. B.*...Cleveland, O.
S. V. Smith, *Asst. Gen. M. C. B.*.....Akron, O.
E'n Div.: A. L. Dunbar, *Supt.*.....Meadville, Pa.
J. A. Cooper, *M. M.*.....Meadville, Pa.
D. S. Dockstader, *M. C. B.*.....Meadville, Pa.
J. F. Fosdick, *For. Car Rep.*Salamanca, N. Y.
W'n Div.: J. W. Alsop, *Supt.*.....Galion, O.
Wm Hill, *M. M.*.....Galion, O.
J. W. Holmes, *For. Car Rep.*.....Galion, O.
Geo. Wilson, *For. Car Rep.*.....Dayton, Ohio.
Maho'g Div.: N. F. Wood, *Asst. Supt.*Cleveland, O.
N. Wright, *M. M.*.....Cleveland, O.
C. N. Thorp, *M. C. B.*.....Cleveland, O.

New York, Providence & Boston R. R.
4-8½ g. 72 m. 39 lo. 430 cars.
J. B. Gardner, *Supt.*.....Providence, R. I.
Giles F. Ward, *Pur. Agt*.....Stonington, Conn.
J. H. Anderson, *M. M. & C. B.*Providence, R. I.
N. Y., Susquehanna & W'n. 4-9 g. 80 m. 20 lo. 350 c.
H. M. Britton, *Gen. M. & P. A.* New York, N. Y.
W. C. Ennis, *M. M. & C. B.*..Wortendyke, N. J.
New York, West Shore & Buffalo Ry.
Chas. Paine, *Gen. Man.*.....New York, N. Y.
Howard Fry, *Supt. M. P.*.....New York, N. Y.
New York, Woodhaven & Rockaway R. R.
4-8½ g. 20 m. 8 lo. 101 cars.
J. M. Lant, *Supt. & P. Agt.* Hunter's Pt., L. I.
W. B. Turner, *M. M.*.....Hunter's Point, L. I.
N. Y. & Greenwood Lake Ry. 4-8½ g. 42 m. 8 lo. 53 c.
J. H. Tinney, *Acting Supt.*..Jersey City, N. J.
J. A. Hardenburg, *Pur. Agt.*.Jersey City, N. J.
A. Hill, *M. M.*.....Pompton, N. J.
N. Y. & Manhattan Beach Ry. 3 g. 23 m. 12 lo. 128 c.
D. C. Corbin, *Man. Dir.*.....New York, N. Y.
O. Fairhurst, *M. M.*.....Greenpoint, L. I.
New York & New England R. R.
4-8½ g. 463 m. 127 lo. 3,326 cars.
S. M. Felton, Jr., *Gen. Man.*.....Boston, Mass.
W. W. McKim, *Pur. Agt*.....Boston, Mass.
A. K. Mansfield, *Supt. M. P.*.....Boston, Mass.
D. F. Wright, *M. C. B.*.....Norwood, Mass.
H. B. Barnum, *Gen. Fore.*.....Norwood, Mass.
East Div: C. C. F. Bent, *Supt*.....Boston, Mass.
Nor. Div.: P. St. M. Andrews, *Supt.*.....Norwich, Ct.
Richard Colburn, *M. M.*.....Norwich, Ct.
Prov. Div.: L. W. Palmer, *Supt.*.Providence, R. I.
Hfrd. Div.: T. W. Kennan, *Supt.*.....Hartford, Ct.
E. M. Humstone, *M. M.*.....Hartford, Ct.
Newburg, Dutchess & Conn. R. R. 4-8½ g. 58 miles.
C. L. Kimball, *Gen. Supt.*.....Mattewan, N. Y.
W. G. Kirkirk, *M. M. & C. B.* do.
Norfolk & Western R. R. 5 g. 428 m. 82 lo. 1,220 c.
Henry Fink, *2d V. Pr. & Gen. Man.*Lynchb'g, Va.
W. W. Crittenden, *Pur. Agt*...Philadelphia, Pa.
C. Blackwell, *Supt. M. P.*.....Roanoke, Va.
Va. & Tenn. Div.: F. Sterk, *M. M.*Lynchburg, Va.
Frank Huger, *Supt*.....Lynchburg, Va.
W. A. Morgan, *M. C. B.*.....Lynchburg, Va.
Nor. & Pt. Div.: N. M. Osborne, *Supt.*.....
J. T. Broyhill, *M. M. & C. B.*Petersburg, Va.
North-Eastern R. R. of Ga. 5 g. 40 m. 2 lo. 18 cars.
H. R. Bernard, *Supt*.....Athens, Ga.
Jno. Longstreet, *M. C. B.*.....Athens, Ga.
North-Eastern R. R. (S. C.) .....(*See Wil. & Wel.*
North Pacific Coast R. R. 3 g. 80 m. 12 lo. 316 cars.
David Ice, *Gen. Supt*.....San Rafael, Cal.
W. F. Russell, *Pur. Agt*.....San Francisco, Cal.
H. Fowler, *M. M.*.....Sancelito Cal.
North Shore.
A. Davis, *Gen. Man.*.....Quebec, Can.
Northern (N. H.), and Concord & Claremont Rys.
4-8½ g. 127 m. 25 lo. 569 cars.
Geo. E. Todd, *Supt*.....Concord, N. H.
Ed. Studley, *M. M. & C. B. & Pur. Agt* do.
Northern R. R. of N. H. .....(*See N. Y., L. E. & W'n.*)
Northern Central Ry. .....(*See Penna. (R. R.)*
North'n Pacific R. R. 4-8½ g. 1,193 m. 104 lo. 3,080 c.
Herman Haupt, *Gen. Man.*.....St. Paul, Minn.
John H. Ames, *Pur. Agt*.....St. Paul, Minn.
Geo. W. Cross, *Supt. Trans*.....St. Paul. Minn.
Geo. W. Cushing, *Supt. M. P. & M.*St. Paul, Minn.
W. J. Brokaw, *M. M.*.....Forsyth, Mon.
Frank Howard, *M. C. B.*.....St. Paul, Minn.
St. P. & Minn. Div.: B. McHugh, *Supt.*.....do.
H. J. Small, *Supt. Mach.*...Brainerd, Minn.
Dakota Div.: C. T. Hobart, *Supt.*.....Fargo, Dak.
A. Rupert, *M. M.*.....Fargo, Dak.
Mo. Div.: D. R. Taylor, *Supt.*.....Mandan, Dak.
E. F. Doran, *M. M.*.....Mandan, Dak.
Yell'st'n Div.: Robert R. Ainslie, *Supt.*Glendive, Mont
S. L. Bean, *M. M.*.....
(2) Western Div.: J. W. Sprague, *Gen. Supt.*; and
Otis Sprague, *Supt.*.....New Tacoma, W. T.
H. D. Sanborn, *Pur. Agt*.....Portland, Ore.
F. C. Ford, *M. M.*.....New Tacoma, W. T.
S. Wishart, *M. C. B.*.....New Tacoma, W. T.
Pend d'Ore Div.: H. W. Fairweather, *Supt.*and
J. F. Curtis, *M. M.*.....Ainsworth, W. T.
Northern of N. J. .....4-5-6 & 4-8½ g. 50 lo. 1,033 c.
James Webster, *Supt*.....Toronto, Canada.
C. W. Postlethwaite, *Pur. Agt*.....Toronto, Can.
P. Clarke, *M. M.*.....Toronto, Can.

O

Ogdensburg & Lake Champlain R. R.
4-8½ g. 122 m. 33 lo. 1,160 cars.
A. A. Gaddis, *Gen. Man.*.....Malone, N. Y.
Abr. Klock, *Supt. & M. M.*.....Malone, N. Y.
Ohio Central R. R. 4-8½ g. 230 m. 30 lo. 3,301 cars.
John E. Martin, *Gen. Man.*.....Toledo, O.
W. H. Vandegrift, *Supt*.....Toledo, O.
F. W. Stewart, *Pur. Agt*.....Toledo, O.
J. B. Morgan, *M. M. & C. B.*.....Bucyrus, O.
Ohio Southern. 4-8½ g. 119 m. 10 lo. 231 cars.
D. R. Ennis, *Supt*.....Springfield, O.
H. C. Norton, *Pur. Agt*.....Indianapolis, Ind.
W. B. Warren, *M. M.*.....Springfield, O.
Ohio & Mississippi Ry. 4-9 g. 615 m. 14 lo. 7,501 cars.
W. W. Peabody, *Gen. Supt*.....Cincinnati, O.
G. E. Atwood, *Pur. Agt*.....Cincinnati, O.
Cin. Div.: C. B. Cole, *Supt*.....Seymour, Ind.
John Thumser, *M. M.*.....Seymour, Ind.
J. P. Chandler, *M. C. B.*.....Aurora, Ind.
Arthur Donaldson, *M. M.*.....Vincennes, Ind.
St. L. & Sp. Div.: C. M. Stanton, *Supt.*St. Louis, Mo.
J. H. Stocker, *M. M.* (Spring. Div.) Pana, Ill.
Louisv. Div.: C. B. Cole, *Supt*.....Louisville, Ky.
Oil City & Ridgway R. R. 4-8½ g. 6 m. 1 lo. 43 cars.
A. F. Kirk, *Gen. Man.*.....Oil City, Pa.
Old Colony R. R. 4-8½ g. 463 m. 110 lo. 2,982 cars.
J. R. Kendrick, *Gen. Supt*.....Boston, Mass.
Main Line: H. H. French, *Supt.*.....Boston, Mass.
R. W. Husted, *Pur. Agt*.....Boston, Mass.
J. K. Taylor, *M. M.*.....Boston, Mass.
A. Gleason, *M. C. B.*.....Boston, Mass.
Cape Cod Div.: C. H. Nye, *Supt.*.Hyannis, Mass.
No. Div.: S. A. Webber, *Supt.*.....Fitchburg, Mass.
George W. Reynolds, *M. M.*.....Taunton, Mass.
Sam. Stevens, *M. C. B.*.....Taunton, Mass.
Olean, Bradford & Warren: Bradford; Kinzua; and
Kendall & Eldred R. Rs. 3 g. 38 m. 9 lo. 222 cars.
J. W. Watson, *Gen. Supt.*.....Olean, N. Y.
J. H. Poole, *Pur. Agt*.....Buffalo, N. Y.
Charles Turner, *M. M. & C. B.*.....Olean, N. Y.
Ontario Southern R. R. 4-8½ g. 24 m. 3 lo. 40 c.
S. B. Stuart, *Supt.*.....Sodus Point, N. Y.
S. B. Stuart, *Pur. Agt*.....Sodus Point, N. Y.
W. H. Cook, *M. M.*.....Sodus Point, N. Y.
Oregon Ry. & Nav. Co. 4 8-½ g. 225 m. 31 lo. 930 cars.
C. H. Prescott, *Manager*.....Portland, Ore.
J. M. Buckley, *Asst Man. & Asst. Supt.* do.
J. M. Fillmore, *Supt. (R. Div.)*.....Portland, Ore.
K. Von Otterendorf, *Supt.* (O. Div.) S. F'cisco, Cal.
J. M. Buckley, *Supt*.....Portland, Ore.
C. C. Hobart, *Gen. M. M.*.....The Dalles, Ore.
Chas. A. Phipps, *M. C. B.*.....The Dalles, Ore.
N. G. Div.: Wm. Reed, *Man.*.....Sodus Point, N. Y.
James Walch, *M. M.*.....Portland, Ore.
Oregon & California R. R. 4-8½ g. 200 m. 14 lo. 280 c.
R. Koehler, *Asst Man. & Asst. Supt.*.....do.
J. Brandt, *Gen. Supt*.....Portland, Ore.
A. Brandt, *M. M.*.....Portland, Ore.
Owensboro & Nashville R. R. ..... 5 g. 0 lo.
W. L. Gude, *Gen. Supt*.....Owensboro, Ky.
H. M. Gable, *M. M. & C. B.*....Owensboro, Ky.

P

Paducah & Elizabeth't'n R R. 5 g. 186 m. 10 lo. 536 c.
Robert Forsyth, *Supt*.....Elizabethtown, Ky.
W. D. Robb, *M. M. & C. B.*.Elizabethtown, Ky.
Painesville & Youngstown R. R. 3 g. 65 m. 7 lo. 319 c.
E. R. Perry, *Gen. Man.*.....Pittsburg, Pa.
J. A. Newcome, *Supt*.....Painesville, O.
J. H. Jones, *M. M.*.....Painesville O.
Panama R. R. ..... 5 g. 58 m. 14 lo. 534 cars.
H. A. Woods, *Supt.*.....Aspinwall, U. S. Col.
E. Z. Penfield, *Pur. Agt*.....New York, N. Y.
Thomas S. O'Brien, *M. M.*Aspinwall, U. S. Col.
Parker & Karns City; and
Karns City & Butler R. Rs. 3 g. 27 m. 5 lo. 84 cars.
W. C. Doherty, *Gen. Supt*.....Parker City, Pa.
Philip Davies, *M. M.*.....Parker City, Pa.
Wm. Wolford, *M. C. B.*.....Parker City, Pa.

Passumpsic R. R. 4-8½ g. 165 m. 28 lo. 105 cars.
E. Raymond, *Pres. & Pur. Agt*..Boston, Mass.
H. E. Folsom, *Supt*.....Lyndonville, Vt.
L. L. Brigham, *M. M.*.....Lyndonville, Vt.
L. F. Woodard, *M. C. B.*.....Lyndonville, Vt.
Peach Bottom R. R. 3 g. 55 m. 0 lo. 32 cars.
Samuel Dickey, *Gen. Man.*.....York, Pa.
G. R. Dickey, *Supt. & Pur. Agt*.....York, Pa.
E. H. Williams, *M. C. B.*.....York, Pa.
E. Div.; S. Dickey, *Supt*.....Oxford, Pa.
W. F. Kirk, *M. M.*.....Oxford, Pa.
Pennsylvania Co.'s (O) Roads. .....
4-5 g. 2,838 m. 817 lo. 29,432 cars.
Wm. Mullins, *Gen. Pass. Agt*.....Pittsburg, Pa.
Joseph Wood, *Supt. M. P.*.....Fort Wayne, Ind.
(1) Clev. & Pittsb'g R. R. 4-9 g. 224 m. 97 lo. 3,336 c.
R. V. Smith, *Asst. Gen. Man.*.....Cleveland, O.
Philip Bruner, *Supt*.....Wellsville, O.
W. F. Beardsley, *Mast. of Mach.* Cleveland, O.
(2 & 3) Erie & Ashtabula Rds. 178 m. 29 lo. 1,340 c.
John M. Kimball, *Supt*.....Youngstown, O.
J. A. Wood, *For. Shops*.....Erie, Pa.
(4) Indianap. & Vincennes Rd. 117 m. 11 lo. 305 cars.
Jas. J. Turner, *Supt*.....Indianapolis, Ind.
M. M......
(5) Jeffersonville, Madison & Indianapolis R. R.
4-9 g. 217 m. 47 lo. 784 cars.
E. W. McKenna, *Supt*.....Louisville, Ky.
Wm. Swanston, *M. M.*.....Jeffersonville, Ind.
Edw. Austin, *M. C. B.*.....Jeffersonville, Ind.
(6) Northwestern Ohio Ry. 4-9 g. 70 m.
J. S. Morris, *Supt*.....Toledo, O.
(7) Pittsburg, Ft. Wayne & Chicago Ry.
4-9 g. 468 m. 278 lo. 6,782 cars.
E'n Div.: A. B. Starr, *Supt*.....Allegheny, Pa.
Geo. J. Parkin, *M. M.*.....Allegheny, Pa.
W'n Div.: C. D. Law, *Supt*.....Ft. Wayne, Ind.
F. D. Casanave, *M. M.*.....Ft. Wayne, Ind.
(8) Pittsburg, Cincinnati & St. Louis Ry.
4-9 g. 1,173 m. 336 lo. 6,482 cars.
Jas. McCrea, *Gen. Supt*.....Columbus, O.
R. H. Soule, *Pur. Agt & M. M.*.....Columbus, O.
P. & Col. Div.: E. B. Taylor, *Supt* Dennison. O.
C. B Street, *M. M.*.....Dennison, O.
Ft. Wayne Div.: *M. C. B.*.....Steubenville, O.
Robt. Curtis, *M. M.*.....Columbus, O.
Thos. Chamberlain, *M. C. B.*.....Columbus, O.
C. & M. Div.: W. F. Black, *Supt*.Zanesville, O.
Leroy Kells, *M. M.*.....Lancaster, O.
Daniel Jewell, *M. C. B.*.....Lancaster, O.
Ll. Mi. Div.: Robert Peters, *Supt*.....Cincinnati, O.
Leroy Kells, *M. M.*.....Cincinnati, O.
Jos. Underwood, *Gen. Foreman*.Cincinnati, O.
Ind. Divs.: J. F. Miller, *Supt*.....Richmond, Ind.
Geo. H. Prescott, *M. M.*.....Logansport, Ind.
Chas. H. Starr, *M. C. B.*.....Logansport, Ind.
M. J. Rogers, *M. M.*.....Indianapolis, Ind.
Chi. Div.: C. C. F. Bent, *Supt*..Logansport. Ind.
(9) Terre Haute & Indianapolis R. R.
4-9 g. 374 m. 83 lo. 2,808 cars.
Joseph Hill, *Gen. Supt*.....St. Louis, Mo.
C. R. Peddle, *P. Agt*.....St. Louis, Mo.
Geo. H. Prescott, *S. M. P. & M.*Terre Haute, Ind.
E. D. Carter, *M. C. B.*.....Terre Haute, Ind.
Clinton Idler, *M. M.*.....Indianapolis, Ind.
Chas. Butler, *M. M.*.....Effingham, Ill.
A. W. Quakenbush, *M. M.*..Logansport, Ind.
Pennsylvania R. R. Co.'s Roads. (7 Gen. Divs.)
4-9 g. 2,704 m. 1,571 loco. 51,894 cars.
Chas. E. Puch, *Gen Man.*.....Philadelphia, Pa.
Enoch Lewis, *Pur. Agt*.....Philadelphia, Pa.
John Reilly, *Supt. Trans.*.....Philadelphia, Pa.
T. N. Ely, *Supt. Mo. Po.*(4 Gen. Divs.)Altoona, Pa.
Frank L. Sheppard, *Supt. M. P.*....Altoona, Pa.
(1) Pennsylvania R. R. Divs.
4-9 g. 1,105 m. 627 lo. 35,583 cars.
S. M. Prevost, *Gen Supt*.....Altoona, Pa
Phila. Div.: Wm. Latta, *Supt* Philadelphia, Pa
H. D. Garrett, *M. M.*.....Philadelphia, Pa
I.W. Van Houten, *M. C. B.*.....W. Phila., Pa.
Mid. Div.: H. H. Carter, *Supt*.....Harrisburg, Pa.
E. L. Caum, *M. M.*.....Harrisburg, Pa.
Samuel W. Myers, *M. C. B.*.....Harrisburg, Pa.
All'a Div.: Jas. Reed, *Supt*.....Altoona, Pa.
G. W. Straitan, *M. M.*.....Altoona, Pa.
John P. Levan, *M. C. B.*.....Altoona, Pa.
Pitts. Div.: Robert Pitcairn, *Supt*.....Pittsburg, Pa.
D. O. Shaver, *M. M.*.....Pittsburg, Pa.
J. G. Stewart, *M. C. B.*.....Pittsburg, Pa.
W. Pa. Div.: A. P. Kirtland, *Supt* Blairsville, Pa.
G. B. Street, *M. M.*.....Blairsville, Pa.
M. H. Fails, *M. C. B.*.....Blairsville, Pa.
Fred. Div.: J. B. Hutchinson, *Supt*.....York, Pa
Tyrone Div.: S. S. Blair, *Supt*.....Tyrone, Pa.
Lew. Div.: Wm. M. Phillips, *Supt.* Lewistown, Pa.
Bed. Div.: Thos. A. Roberts, *Supt*.....Bedford, Pa.
Monong. Div.: David M. Watt, *Supt.*Pittsburg, Pa.
Wm. Lininger, *M. M.*.....Pittsburg, Pa
2) United R. Rs of N. J. Divs. 414 m. 257 lo. 4,968 c
F. Wolcott Jackson, *Gen. Supt.* Jersey City, N. J.
N.Y. Div.: Robt. E. Pettit, *Supt* Jersey City, N. J
H. S. Hayward, *St. M. P.*.....Jersey City, N. J.
David H. Baker, *M. C. B.*.....Jersey City, N. J.
L. A. Bosdevex, *M. M.*.....Jersey City, N. J.
E. F. Bosdevex, *M. C. B.*.....Jersey City, N. J.
Belv. Div.: J. A. Anderson, *Supt* Lambertv., N. J
R. McDowell, *M. M.*.....Lambertville, N. J.
Amboy Div.: J. S. Buckalew, *Supt* Camden, N. J
Thos. Kerr, *M. M.*.....So. Amboy, N. J
P. S. Bogart, *M. C. B.*.....So. Amboy, N. J
(3) West Jersey R. R. 4-9 g. 163 m. 22 lo. 342 cars
Joseph Crawford, *Supt*.....Camden, N. J
W. McAllister, *M. M.*.....Camden, N. J
C. C. Williams, *M. C. B.*.....Camden, N. J
(4) Phila., Wilm. & Balt. R.R. 212 m. 86 lo. 1,488 c.
H. F. Keney, *Gen. Supt*.....Philadelphia, Pa.
S. A. Hodgman, *M. M.*.....Wilmington, Del.
Wm. Lundgren, *M. C. B.*.....Wilmington, Del.
Cen. Div.: L. K. Lodge, *Supt*.....Philadelphia, Pa.
S. D. Dannfield, *M. M. & C. B.*.....Chester, Pa.
Del. Div.: I. N. Mills, *Supt*.....Philadelphia, Pa.
(5) Phila. & Erie R. R. Divs.: 376 m. 177 lo. 3,481 c.
R. Neilson, *Gen Supt*.....Williamsport, Pa.
A. O. Dayton, *Supt. Mo. Po.*..Williamsport, Pa.
E'n Div.: Thos. Hucker, *Supt* Williamsport, Pa.
Sun. H. & W. Div.: A. Waters, *Supt.*; and
W. F. Beardsley, *M. M.*.....Sunbury, Pa.
Mid. Div.: F. Smith, *Supt*.....Renova, Pa.
Wm. L. Holman. *M. M.*.....Renova, Pa.
West'n Div.: J. W. Reynolds, *Supt*.....Erie, Pa.
W. F. Smith, *M. M.*.....Erie, Pa.
(6) Northern Central Ry. 4-9 g. 326 m. 152 lo. 6,161 c.
A. W. Sumner, *Pur. Agt*.....Baltimore, Md.
Susq. Shamokin, Almira & Canadaigua Divs.:
Robert Neilson, *Gen. Supt.*.....Williamsport, Pa.
A. O Dayton, *Supt. M. P.*.....Williamsport, Pa.
Susq. Div.: Thos. Gucker, *Supt.*Williamsport, Pa.
Sham. Div.: *Supt*.....Shamokin, Pa.
Elm. & Can. Divs.: S. Meade, *Supt*..Elmira, N. Y.
Jas. Snyder, *M. M.*.....Elmira, N. Y.
J. C. Dyott, *M. C. B.*.....Dunmore, Pa.
Baltimore Divs. of Northern Central; and
(7) Baltimore & Potomac R. R. 128 m. 29 lo. 356 c.
G. C. Wilkins, *Supt. of Mach.*.....Baltimore, Md.
A. W. Sumner, *Pur. Agt*.....Baltimore, Md.
J. M. Wills, *Supt. Mo. Po.*.....Baltimore, Md.
J. M. Coale, *M. M.*.....Baltimore, Md.
G. W. Demarest, *M. C. B.*.....Baltimore, Md
Penn. Coal Co.'s R. R. 4-3 g. 67 m. 23 eng. 2,871 c.
J. B. Smith, *Gen. Supt*.....Dunmore, Pa.
And. Crane, *M. M.*.....Dunmore, Pa.
Geo. W. Simpson, *M. C. B.*.....Dunmore, Pa.
Pennsylvania & Erie R. R.—Early Branch.
C. R. Early, *Gen. Supt*.....Ridgeway, Pa.
Pensacola & Pen'dido R. R. 6 g. 8 m. 5 lo. 73 cars.
R. F. Simmons, *Pr. & Supt*.....Pensacola, Fla.
H. W. Simmons, *Pur. Agt*.....Pensacola, Fla.
R. G. Nicholl, *M. M. & C. B.*.....Pensacola, Fla.
Peoria, Decatur & Evansville R. R.
4-8½ g. 215 m. 12 lo. 725 cars.
G. L. Bradbury, *Gen. Man.*.....Peoria, Ill
Supt. & Pur. Agt.....Peoria, Ill
P. Reilly, *M. M.*.....Mattoon, Ill.
Peoria & Farmington R. R. 4-8½ g. 25 m. 2 lo. 25 c.
D. F. Phelps, *Gen. Man.*.....Monmouth, Ill.
John F. Wallace, *Supt*.....Farmington, Ill.
Peoria & Pekin Union Ry. 4-8½ g. 20 m. 12 lo. 100 c.
Thos. B. Burnett, *Gen. Supt. & P. A.*Peoria, Ill.
R. F. Hurd, *M. M. & C. B.*.....Peoria, Ill.

Perkiomen R. R. 4-8½ gauge 39 miles.
D. B. Clack, *Supt*.....Norristown, Pa.
Petersburg R. R. 4-8½ g. 64 m. 10 lo. 131 cars
R. M. Selly, *Gen. Supt*.....Petersburg, Va.
L. E. Clark, *Pur. Agt*.....Petersburg, Va.
R. B. Andrews, *M. M.*.....Petersburg, Va.
J. W. Fleming, *M. C. B.*.....Petersburg, Va.
Phila., Wilmington & Balt. R. R. (*See Penna. R. R.*)
Phila. & Atlantic City Ry. 3-6 g. 65 m. 11 lo. 134 cars.
F. S. Urie, *Supt. & Pur. Agt.* Philadelphia, Pa.
J. W. Wright, *M. M.*.....Camden, N. J.
E. Lippincott, *M. C. B.*.....Camden, N. J.
Phila. & Reading. 4-8½ g. 969 m. 516 lo. 21,960 cars.
John E. Wootten, *Gen. Man.*.Philadelphia, Pa.
W. S. Wilson, *Pur. Agt*.....Philadelphia, Pa.
Geo. Eltz, *Supt Transf.*.....Reading, Pa.
L. B. Paxson, *Eng. of Mach.*.....Reading, Pa.
John H. Rankin, *M. C. B.*.....Reading, Pa.
No. Pa. & B. Brk. Div.: I. A. Sweigard, *Supt.*.and
Jackson Richards, *M. M.*.....Philadelphia, Pa.
C. & W. Br.: C. Reinhart, *Sup.* Williamsport, Pa.
W. H. Ellis, *M. M.*.....Catasauqua, Pa.
C. D. Ellis, *M. C. B.*.....Catawissa, Pa.
Leh. Tr. Br.: H. W. Tracy, *Supt.*Pine Grove, Pa.
Coal Br.: J. H. Othausen, *Supt.*Mahony Plane, Pa.
R. & C. Br.: A. M. Wilson, *Supt.*.

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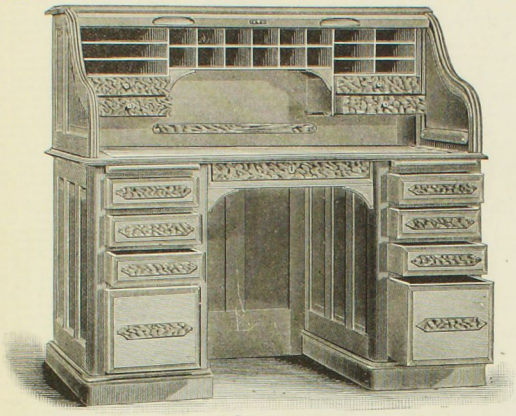

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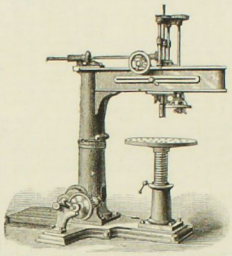

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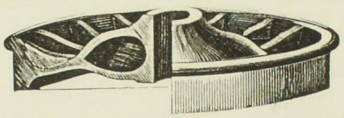
BELOIT, WIS.



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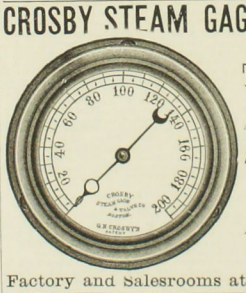

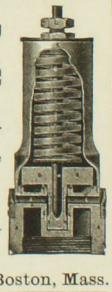

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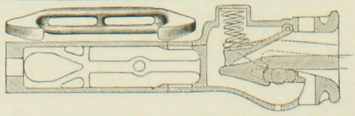

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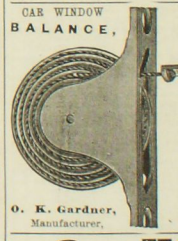

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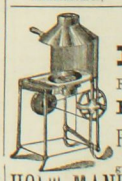

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Richmond & Petersburg R R. 4-8½ g. 25 m. 8 lo. 130 c.
J. R. Kenly, *Supt.*.....Richmond, Va.
John O'Brien, *M. M.*.....Richmond, Va.
Rio Grande R. R. 3-6 g. 22 m. 3 lo. 30 cars.
M. J. Gomila, *Rec. & Gen. Man* Brownsville, Tex.
G. W. Rendall, *M. M.*.....Brownsville, Tex.
M. Markwood, *M. C. B.*.....Brownsville, Tex.
Rochester & Pittsb'g. R.R. 4-8½ g. 108 m. 11 lo. 612 c.
Geo. E. Merchant, *Gen. Man.*..Rochester, N. Y.
J. P. Hovey, *M. M.*.....Rochester, N. Y.
Rock Island & Mercer County R. R., and
Rock Isl'd & Peoria Ry. 4-8½ g. 113 m. 12 lo. 357 c.
R. R. Cable, *V.-P. & Gen. Supt.* Rock Island, Ill.
R. I. & P. Ry.; H. B. Ludlow, *Supt. & P. A.* do.
Joseph Elder, *M. M.*.....Peoria, Ill.
R. I. & M. C. Rd.; B. T. Cable, *Supt.* R'k Island, Ill.
J. Parks, *M. M.*.....Rock Island, Ill.
Rome (Ga.) R. R. 5 g. 20 m. 2 lo. 14 cars.
Eben Hillyer. *Supt.*.....Rome, Ga.
O. W. Harbin, *M. M. & C. B.*.....Rome, Ga.
Rome, Watertown & Ogdensburg R. R.
4-8½ g. 409 m. 51 lo. 1,248 cars.
E. A. Van Horne, *Gen. Supt.*..Oswego, N. Y.
Geo. W. B. Cushing, *Pur. Agt.* New York, N. Y.
Geo. H. Haselton, *M. M. & C. B.*..Oswego, N. Y.
Rumford Falls & Buckfield R.R. 4-8½ g. 29 m. 21.42 c.
O. Harford, *Supt.*.....Buckfield, Me.
O. Spaulding, *Pur. Agt.*.....Buckfield, Me.
E. R. Oldham, *M. M.*.....Buckfield, Me.

S

Sabine & East Texas Ry. 4-8½ g. 25 m. 5 lo. 306 c.
J. B. Morford, *Gen. Supt.*.....Beaumont, Tex.
R. H. Cousins, *Supt.*.....Beaumont, Tex.
Chas. Bunn, *M. M.*.....Beaumont, Tex.
Sacramento & Placerville R. R. 4-8½ g. 40 m. 3 lo. 68 c.
J. B. Wright, *Supt. & P. A.*.....Sacramento, Cal.
A. J. Stevens *M. M.*.....Sacramento, Cal.
Benj. Welch, *M. C. B.*.....Sacramento, Cal.
Saginaw Bay & Northw'n R. R. 4-8½ g. 30 m. 2 lo. 4 cars.
E. W. Gerrish, *Supt.*.....Pinconning, Mich.
F. T. Lillot, *Pur. Agt.*.....Pinconning, Mich
And. Miller, *M. M.*.....Pinconning, Mich.
Saginaw Valley & St. Louis R. R. 4-8½ g. 35 m. 4 lo. 64 c.
N. W. Merrill, *Supt.*.....Saginaw, Mich.
Allan Bourn, *Pur. Agt.*.....Detroit, Mich.
Geo. C. Watrous, *M. M.*.....Iona, Mich.
San Francisco & No. Pac. 4-8½ g. 112 m. 11 lo. 244 c.
Arthur Hughes, *Gen. Man.*..San Francisco, Cal.
H. C. Whiting, *Supt.*.....Petaluma, Cal.
F. E. Dougherty, *Pur. Agt* San Francisco, Cal.
Ed. Reynolds, *M. M.*.....Donahue, Cal.
M. C. B......Donahue, Cal.
San Luis Obispo & Santa Maria Val. R. R. 3 g. 11 m.
C. A. Haskin, *Supt. & P. Agt* San Luis Obispo, Cal.
W. H. Masterman, *M. M* San Luis Obispo, Cal.
J. M. Vincent, *M. C. B.*..San Luis Obispo, Cal.
Savannah, Florida & W'n Ry. 5 g. 422 m. 50 lo. 695 c.
H. S. Haines, *Gen. Man.*.....Savannah, Ga.
R. G. Fleming, *Supt.*.....Savannah, Ga.
A. A. Aveille, *Pur. Agt.*.....Savannah, Ga.
James D. Hollister, *M. of Mach.*..Savannah, Ga.
Jos. W. Rowell, *For. Car Dept* Savannah, Ga.
Sav., Griffin & No. Ala. R. R. *Op. by Central (Ga.).*
Schuylkill & Lehigh R. R. 4-8½ g. 83 miles.
Elbridge Dale, *Supt.*.....Reading, Pa.
Scobarie Valley R. R. (*See Middleburg & Sch.*)
Scioto Valley R. R. 4-8½ g. 131 m. 15 lo. 400 cars.
Geo. Skinner, *Supt.*.....Columbus, O
H. Bromley, *M. M. & P. A.*.....Portsmouth, O.
Seaboard & Roanoke R. R. 4-8½ g. 80 m. 21 lo. 381 c.
E. G. Ghio, *Most. of Trans.*..Portsmouth, Va.
M. M. Pendleton, *S. M. P. & M.* Portsmouth, Va.
Shenandoah Valley R. R. 4-8½ g. 143 m. 15 lo. 104 c.
Henry Fink, *Gen. Man.*.....Lynchburg, Va.
C. H. Sands, *Supt.*.....Hagerstown, Md.
W. C. Pa. Armond, *Pur. Agt.* Philadelphia, Pa.
Chas. Blackwell, *Supt. of M. P.*..Roanoke, Va.
Jno. McCallister, *M. M.*..Shepherdstown, W. Va.
H. Crowe, *M. C. B.*..Shepherdstown, W. Va.
Shenango & Allegheny R R 4-9½ g. 47 m. 6 lo. 156 c.
J. T. Blair, *G. Supt. & Pur. Agt* Greenville, Pa.
Edw. Richardson, *M. M & C. B* Greenville, Pa.
Shepaug R. R. 4-8½ g. 38 m. 3 lo. 27 cars.
Edwin McNeill, *Supt.*.....Litchfield, Ct.
C. M. Allen, *M. M.*.....Litchfield, Ct.
Ship Is., Ripley & Ky. R. R. 3 g. 25 m. 2 lo. 23 cars.
C. L. Harris, *Supt. & Pur. Agt.*.....Ripley, Miss.
W. H. Phips, *M. M.*.....Ripley, Miss
Sioux City & Pacific R. R. 4-8½ g. 427 m. 21 lo. 594 c.
P. E. Hall, *Gen. Man. & P. A.* Cedar Rapids, Ia.
J. S. Wattles, *Supt.*.....Missouri Valley, Ia.
C. F. McCoy, *Asst. Supt.*.....Blair, Neb.
S. A. Teal, *M. M.*.....Missouri Valley, Ia.
W. H. Ramseyer, *M. C. B.*.....do.
South Carolina Ry. 5 g. 243 m. 42 lo. 685 cars.
John B. Peck, *Gen. Man.*.....Charleston, S. C.
S. B. Pickens, *Pur. Agt.*.....Charleston, S. C.
P. J. Cochrane, *Mast. of Mach.* Charleston, S. C.
Geo. H. Gramling, *M. C. B.*.....Charleston, S. C.
South-Eastern Ry. 4-8½ g. 200 m. 20 lo. 826 cars.
Bradley Barlow, *Gen. Man.*.....Montreal, Can.
T. A. McKinnon, *Asst. Supt.*.....Montreal, Can.
H. A. Alden, *Supt.*.....Richford, Vt.
A. G. Eastman, *M. M.*.....Richford, Vt.
South Florida R. R. 3 gauge 40 m. 4 lo. 20 cars.
B. R. Swoope, *Supt. & P. A.*.....Sanford, Fla.
C. C. Haskell, *Pur. Agt.*.....Sanford, Fla.
J. A. Campbell, *M. M.*.....Sanford, Fla.
A. D. Stentiford, *M. C. B.*.....Sanford, Fla.
South Mountain R. R. 4-8½ g. 18 m. 4 lo. 22 c.
W. H. Woodward, *Supt.* Pine G've Furnace, Pa.
South Pacific Coast R. R. 3 g. 81 m. 10 lo. 200 cars.
A. H. Fracker, *Gen. Supt.*..San Francisco, Cal.
G. H. Waggoner, *Pur. Agt.*..San Francisco, Cal.
E. L. Reese, *M. M. & C. B.*.....Newark, Cal.
South-Western R. R. (Ga.) *(See Central of Ga.)*
South-Western Ry. (Ky.) 4-8½ g. 4 m. 1 lo. 38 cars.
J. M. Wilson, *Supt.*.....Harrodsburg, Ky.
J. Tomlinson, *Pur. Agt.*.....Harrodsburg, Ky.
Southern Central R. R. 4-8½ g. 114 m. 16 lo. 447 c.
James G. Knapp, *Supt.*.....Auburn, N. Y.
H. D. Titus, *Pur. Agt.*.....Auburn, N. Y.
Chas. G. Brown, *M. M.*.....Auburn, N. Y.
H. Mooney, *M. C. B.*.....Auburn, N. Y.
Southern Maryland R. R. 4 g. 47 m.
Shields Burr, *Supt.*.....Brandywine, Md.
C. J. Royce, *M. M.*.....Brandywine, Md.
Southern Pacific R. R. 4-8½ g. 161 m. Effingham, 738 c.
Northern Div. *(For other Divs. see Cen. Pac.)*
A. C. Bassett, *Supt.*.....San Francisco, Cal.
J. R. Watson, *Pur. Agt.*.....Sacramento, Cal.
J. T. Wilson, *M. M.*.....San Francisco, Cal.
F. N. Bellisle, *M. C. B.*.....San Francisco, Cal.
Springfield, Effingham & So. Eastern and Bloomfield Rys. 3 g. 89 m.
W. C. Lyon, *Gen. Man.*.....Robinson, Ill.
E. Pratt Buell, *Pur. Agt.*.....Effingham, Ill.
J. S. Pickering, *M. M. & C. B.*.....Effingham, Ill.
Spring Hill & Parrsboro Ry. 4-8½ g. 32 m. 1 lo. 64 c.
J. Killam, *Supt.*.....Parrsboro, N. S.
K. McKinnon, *M. M.*.....Parrsboro, N. S.
St. Croix & Penobscot R. R. 4-8½ g. 22 m. 4 lo. 195 c.
S. W. Haycock, *Supt. & Pur. Agt.*..Calais, Me.
G. H. Corson, *M. M.*.....Milltown, Me.
H. C. Tincker, *M. C. B.*.....Milltown, Me.
St. John & Maine Ry. 4-8½ g. 92 m. 6 lo. 110 cars.
H. D. McLeod, *Supt. & P. Agt.*..St. John, N. B.
A. McIntyre, *M. M.*.....St. John, N. B.
St. John's Ry. 4-8½ g. 141½ m. 2 lo. 24 cars.
R. McLaughlin, *Pr. & Supt.*..Jacksonville, Fla.
Geo. Ferro, *M. of Mach.*.....Tocoi, Fla.
St. Johnsb'ry & Lake Champ 4-8½ g. 120 m. 10 lo. 197 c.
A. B. Jewett, *Supt. & P. A.*..St. Johnsbury, Vt.
Geo. E. Howe, *M. M. & C. B.*St. Johnsbury, Vt.
St. Joseph & Des Moines R. R. *(See K. C., St. J. & C. B.)*
St. Lawrence & Ottawa Ry. 4-8½ g. 59 m. 10 l. 146 c.
Archer Baker, *Gen. Supt.*.....Ottawa, Can.
Alvin Dame, *M. M. & C. B.*..Prescott, Can.
St. Louis, Alton & Terre Haute R. R.
Main Line *(See Ind. & St. L. Div. : Ohio Ry.)*
St. Louis & Cairo Div.: 4-8½ g. 123 m. 16 lo. 778 c.
G. W. Parker, *Gen. Man.*.....St. Louis, Mo.
J. L. Hinde, *Supt.*.....Belleville, Ill.
A. M. De Clerq, *M. M.*.....St. Louis, Mo.
St. Louis Bridge Co. and Tunnel R. R.
4-8½ g. 7 m. 15 lo. 11 cars.
Wm. Taussig, *Gen. Man.*.....St. Louis, Mo.
A. W. Dickinson, *Supt.*.....St. Louis, Mo.
J. E. Williams, Jr., *Pur. Agt.*..St. Louis, Mo.
H. M. Smith, *M. M.*.....St. Louis, Mo.
St. Louis Coal R. R. 4-8½ g. 28 m. 1 lo. 78 cars.
Jas. Hinde, *Supt.*.....Carbondale, Ill.
Jas. C. Bryden, *Pur. Agt.*.....St. Louis, Mo.
St. Louis, Ft. Scott & Wichita R. R. 4-8½ g. 20 miles.
F. Tierney, *V. P. & Gen. Man.* Fort Scott, Kan.
J. D. Hill, *Gen. Supt.*.....Fort Scott, Kan.
S. C. Young, *M. M.*.....Ft. Scott, Kan.
A. A. Lydell, *M. C. B.*.....Ft. Scott, Kan.
St. L., Hannibal & Keokuk. 4-8½ g. 50 m. 1 lo. 23 c.
W. W. Walker, *Supt.*.....Hannibal, Mo.
Geo. Douglass, *Pur. Agt.*.....Hannibal, Mo.
St. Louis, Iron Mountain & Southern Ry. (1):
International & Great Northern R. R (2); and
Texas & Pacific Ry. (3).
4-8½ g. 2,078 m. 30.2 lo. 6,119 cars.
R. B. Lyle, *Gen. Pur. Agt.*.....St. Louis, Mo.
(1) St. L., I. M. & So. 4-8½ g. 710 m. .37 lo. 4,081 c.
Wm. Berrigan, *Supt.*.....St. Louis, Mo.
O. A. Haynes, *Supt. Mach.*.....De Soto, Mo.
H. H. Sessions, *M. C. B.*.....St. Louis, Mo.
St. Louis Div.: J. J. Frey, *Supt.*.....St. Louis, Mo.
W. H. Harris, *M. M.*.....De Soto, Mo.
Ark. Div.: Wm. Kerrigan, *Supt.* Little Rock, Ark.
R. M. Richardson, *M. M. & C. B.* do.
(2) Inter. & Gr't No'n R. R. 4-8½ g. 776 m. 45 lo. 932 c.
Jos. Herrin, *Supt.*.....Palestine, Tex.
R. H. Johnson, *M. M.*.....Palestine, Tex.
H. H. Sessions, *M. C. B.*.....Palestine, Tex.
3) Texas & Pac. Ry. 4-8½ g. 1,030 m. 120 lo. 1,106 c.
E. L. Dudley, *Supt.*.....Marshall, Tex.
J. F. Sechler, *G. M. M.*.....Marshall, Tex.
H. H. Sessions, *M. C. B.*.....Marshall, Tex.
So'n Div.; Hugh Irvine, *Supt.*.....Longview, Tex.
W. Gardner, *M. M.*.....Marshall, Tex.
Tr. Con. Div.: J. L. Thorn, *Supt* Texarkana, Ark.
Wilson Garrison, *M. M.*.....Texarkana, Ark.
W'n Div.: Wm. Sims, *Supt.*.....Ft. Worth, Tex.
W. H. Reilly, *Asst. G. M. M.* Fort Worth, Tex.
St. L. Keokuk & No.-W'n. 4-8½ g. 187 m. 14 lo. 312 c.
J. W. Smith, *Gen. Supt. & P. Agt.*..Keokuk, Ia.
Wm. H. Bacon, *M. M.*.....Keokuk, Ia.
St. L., Salem & Little Rock. 4-9 g. 69 m. 5 lo. 103 c.
H. A. Crawford, *V. Pr. & P. A.*..St. Louis, Mo.
E. B. Sankey, *Supt.*.....Salem, Mo.
Thomas Hughes, *M. M.*.....Steelville, Mo.
J. W. Houston, *M. C. B.*.....Steelville, Mo.
St. L., Van. & T. H. *(See T. H. & I. Div. of Penna. Co.)*
St. Louis & Wabash R. R. 4-8½ g. 146 m. 23 lo. 708 cars.
Chas. Hamilton, *Gen. Supt.*.....St. Louis, Mo.
R. M. Pringle, *M. M.*.....East Carondelet, Ill.
St. L. & San Fran. Ry. 4-8½ g. 695 m. 71 lo. 2,490 c.
C. W. Rogers, *M. M. & G. Mas.*..Sherman, Tex.
D. H. Nichols, *Mast. Trans.*..No. Springfield, Mo.
A. G. Thompson, *Pur. Agt.*.....St. Louis, Mo.
M. Kenney, *M. M. & C. B.*.....St. Louis, Mo.
Mo. & Ark. Div.: W. A. Thoms, *Supt.*.....Ft.
Kan. Div.: J. R. Wentworth, *Supt.* Neodesha, Kan.
St. Marie's Uphaus Ry. 4-8½ g. 30 m. 1 lo.
A. E. Killam, *Manager*.....St. Martin's, N. B.
St. Paul, Minneapolis & Manitoba Ry.
3 g. 1,050 m. 116 lo. 3,116 cars.
A. Manvel, *Gen. Man.*.....St. Paul, Minn.
S. R. Stimson, *Gen. Supt.*.....St. Paul, Minn.
E. B. Watson, *Asst. Supt. Trans.*..St. Paul, Minn.
J. C. Morrison, *Pur. Agt.*.....St. Paul, Minn.
H. Middleton, *M. M. & C. B.*..St. Paul, Minn.
Brech Div.: A. Guthrie, *Supt.*..St. Paul, Minn.
F. F. Div.; J. B. Rice, *Supt.*.....St. Paul, Minn.
No'n Div.: D. K. Smith, *Supt.*...Crookston, Minn.
St. Paul & Duluth R. R. 4-8½ g. 196 m. 24 lo. 580 c.
S. R. Stimson, *Gen. Supt.*.....St. Paul, Minn.
J. G. Callahan, *Pur. Agt.*.....St. Paul, Minn.
W. McFarland, *M. M.*.....St. Paul, Minn.
John Hill, *M. C. B.*.....St. Paul, Minn.
Sterling Mountain Ry. 6 g. 8 m. 2 lo. 145 cars.
J. C. Missimer, *Supt.*.....Sloatsburg, N. Y.
Syracuse, Binghamton & N. Y. R. *(See D., L. & W.)*
Syracuse, Chenago & N. Y. 4-8½ g. 44 m. 4 lo. 60 c.
Albert Allen, *Supt.*.....Syracuse, N. Y.
George W. West, *M. M.*.....Syracuse, N. Y.
Wm. J. McMichael, *M. C. B.*..Syracuse, N. Y.
Syracuse, Geneva & Corning; Corning, Cowanasque & Antrim R. Rs. 4-8½ g. 121 m. 25 lo. 1,000 c.
A. H. Gorton, *Supt.*.....Corning, N. Y.
Andrew Beers, *Pur. Agt.*.....Corning, N. Y.
O. C. Patterson, *M. M.*.....Corning, N. Y.
C. J. Butler, *M. C. B.*.....Corning, N. Y.

T

Terre Haute & So.-Eastern Ry. 4-9 g. 40 miles.
Geo. Atherton, *Supt.*.....Terre Haute, Ind.
Texas-Mexican and Mexican National Rys.
3 g. 333 m. 28 lo. 600 cars.
G. C. Gardner, *Gen. Man* ....New York, N. Y.
R. C. Peebles, *Supt.*.....Mexico, Mex.
J. Dougherty, *Pur. Agt.*.....New York, N. Y.
S. T. Fuller, *Gen. Supt.*.....Corpus Christi, Tex.
P. J. Blan, *M. M. & C. B.*.....do.
Mex. Nat. Ry.: J. C. Monroe, *M. M.*..Mexico, Mex
Texas Western Ry. 3 g. 42 m. 2 lo. 34 cars.
J. W. Goodwin, *Supt.*.....Houston, Tex.
T. F. Glispin, *M. M.*.....Houston, Tex.
Texas & New Orleans; Louisiana W'n R. Rs.
4-8½ g. 217 m. 25 lo. 600 c.
J. F. Crosby, *Gen. Man.*.....Houston, Tex.
P. B. Watson, *Pur. Agt.*.....Houston, Tex.
J. A. Burton, *Supt.*.....Houston, Tex.
D. C. Smith, *M. M.*.....Houston, Tex.
Jno. Mather, *M. C. B.*.....Houston, Tex.
Texas & St. Louis Ry. 3 g. 258 m. 15 lo. 290 cars.
J. Van Dyne, *Gen. Supt.*.....Tyler, Tex.
F. W. Paramore, *Pur. Agt* .....St. Louis. Mo.
L. B. Fisher, *Pur. Agt.*.....Tyler, Texas.
W. J. Lewis, *M. M.*.....Tyler, Tex.
Tioga and Elmira State Line R. Rs.
4-8½ and 6 g. 54 m. 17 lo. 953 cars.
L. H. Shattuck, *Supt.*.....Blossburg, Pa.
James A. Drake, *Pur. Agt.*.....Elmira, N. Y.
Pere Bonny, *M. M.*.....Blossburg, Pa.
D. H. Stratton, *M. C. B.*.....Blossburg, Pa.
Toledo, Ann Arbor & Gr. Tr. Ry. 4-8½ g. 84 m. 7 lo. 107 c.
M. D. Woodford, *Gen. Man.*..Ann Arbor, Mich.
H. W. Ashley, *Supt. & Pur. Agt.* do
C. C. Dodge, *M. M.*.....Ann Arbor, Mich.
Toledo, Cin. & St. Louis R. R. 3 g. 465 m. 63 lo. 2,200 c.
T. A. Filips, *Gen. Man.*.....Toledo, O.
J. H. Fr'eiers, *Supt. Mach. & P. Agt* Toledo, O.
Toledo Div.: A. M. Matheany, *Supt.*..and
A. D. Stewart, *M. M.*.....Delphos, O.
C. H. Mead, *Gen. M. C. B.*.....Delphos, O.
S.-E'n & Dayton Div.: D. C. Bacon, *Supt.* Dayton, O.
J. T. Wright, *M. M.*.....Dayton. O.
Tonawanda Valley R. R. 3 g. 19 m. 1 lo. 13 cars.
J. V. D. Loomis, *Supt.*.....Attica, N. Y.
Toronto, Grey & Bruce Ry. 4-8½ g. 191 m 20 lo 446 c.
Edmund Wragge, *Gen. Man.*..Toronto, Can.
W. Watson, *Pur. Agt.*.....Toronto, Can.
David Preston, *M. M.*.....Toronto, Can.
Troy & Boston R. R. 4-8½ g. 48 m. 20 lo. 484 cars.
D. Robinson, *Pres. & Pur. Agt.*.....Troy, N. Y.
Joseph Crandell, *Supt.*.....Troy, N. Y.
Z. B. Davis, *M. M.*.....Troy, N. Y.
R. V. Coon, *M. C. B.*.....Troy, N. Y.
Tuckerton R. R. 4-8½ g. 31 m. 2 lo. 28 cars.
J. J. Pharo, *Supt.*.....Tuckerton, N. J.

U

Ulster & Delaware R. R. 4-8½ g. 74 m. 7 lo. 142 cars.
Jas. H. Jones, *Supt.*.....Rondout, N. Y.
Geo. W. Wright, *M. M.*.....Rondout, N. Y.
John H. Decker, *M. C. B.*.....Rondout, N. Y.
Union Pacific Ry. (4 Gen. Divs.)
3 & 4-8½ g. 4,270 m 318 lo. 6,157 cars.
S. H. H. Clark, *Gen. Man.*.....Omaha, Neb.
Thos. L. Kimball, *Asst. Gen Man.* Omaha, Neb.
A. D. Clarke, *Pur. Agt.*.....Omaha, Neb.
(1) Union Div.: *Gen. Supt.*..Omaha, Neb.
I. H. Congdon, *Gen. M. M.*.....Omaha, Neb.
Geo. E. Stevens, *Supt. Car Dept.* Omaha, Neb.
East. Divs.: P. J. Nichols, *Supt.*.....Omaha, Neb.
Robt. McConnell, *M. M.*.....Omaha, Neb.
A. M. Collett, *M. C. B.*.....Omaha, Neb.
Jas. H. McConnell, *M. M.*.....No. Platte, Neb.
A. Reis, *For. Car. Sh.*.....No. Platte, Neb.
Mtn. Div.: Robt. Law, *Supt.*.....Cheyenne, Wy. T.
T. A. Davies, *M. M.*.....Cheyenne, Wy. T.
J. E. Davies, *For. Car. Sh.*..Cheyenne, Wy. T.
Lar. Div.: E. Dickinson, *Supt.*..Laramie, Wy. T.
R. Galbraith, *M. M.*.....Laramie, Wy. T.
R. M. Galbraith, *M. M.*.....Rawlins, Wy. T.
Frank Blake, *For. Car. Sh.*...Rawlins, Wy. T.
West. Div.: C. C. Quinn, *M. M.* Evanston, Wy. T.
R. V. Brinkley *Master Car.* Evanston, Wy. T.
Utah Nor. Div.; G. W. Thatcher, *Supt.* Logan, U
R. Craft, *M. M.*.....Logan, U.
F. Reardon, *M. M.*.....Eagle Rock, Idaho.
F. M. Shoemaker, *For. Car. Sh.* Eagle R'k, Ida.
Col. Div.: A. A. Egbert, *Supt.*.....Denver, Col.
Fred. Metzeimer, *M. M.*.....Golden Col.
E. G. Thomas, *For. Car. Sh.*.....Golden, Col.
St. J. & W'n. Rd.: L.D. Tuthill, *Supt.* St. Joseph, Mo.
E. Sleppy, *M. M.*.....Grand Island, Neb.
E. Hansen, *For. Car. Sh.*.....St. Joseph, Mo.
Kansas Div.: S. T. Smith, *G. Supt.* Kansas C'y, Mo.
Jno. Mackenzie, *Supt. Mach.* Armstrong, Kan.
T. B. Roberts, *M. M. & G. Mas.*..Armstrong, Kan.
K. Val. Div.; J. O. Brinkerhoff, *Supt.* Kan. C'y, Mo.
Jas. Mackenzie, *M. M.*.....Armstrong, Kan.
Smoky Hill & Denver Divs.:
O. H. Dorrance, *Supt.*.....Wallace, Kan.
J. B. Dailey, *M. M.* (S. H. Div.)....Ellis, Kan.
Chey. Div.: A. A. Egbert, *Supt.*.....Denver, Col.
R. McDougall, *M. M.* (D. & C. Divs.)Denver, Col.
W. Ogle, *For. Car. Sh.* (D. & C. Divs.) do
Kan. Cen. Div.: 3 g. 150 miles.
W. J. Kelley, *Supt.*.....Leavenworth, Kan.
And. Goldthwaite, *M. M.* Leavenworth, Kan.
J. P. Newman, *M. C. B.*..Leavenworth, Kan.
(3) Denver & South Park Div. 3 ft. gauge 227 miles.
C. W. Fisher, *Gen Supt.*.....Denver, Col.
J. H. Kirk, *M. M.*.....Denver, Col.
(4) Nevada Central Ry. 3 g. 93 m. 5 lo. 82 cars.
F. W. Dunn, *Supt.*.....Battle Mountain, Nev.
Z. T. Spriggs, *M. M.*.....Battle Mountain, Nev.
United States Rolling Stock Co. 23 lo. 4,834 cars.
A. Hegewisch, *Pres.*.....New York, N. Y.
C. F. Laurlet, *Gen. M. M. & P. A.* Chicago, Ill.
Utah Central Ry. 4-8½ g. 280 m.
John Sharp, *Gen. Supt.*..Salt Lake City, Utah.
S. H. Hill, *Pur. Agt.*.....Salt Lake City, Utah.
W. B. Armstrong, *M. M.*..Salt Lake City, Utah.
Peter Reid, *M. C. B.*.....Salt Lake City, Utah.
Utah & Nevada Ry. 3 g. 37 m.
W. W. Ritter, *Gen. Man.*..Salt Lake City, Utah.
Robert Anderson, *M. M.*..Salt Lake City, Utah.
Utah & Pleasant Valley Ry. 60 m.
G. M. Young, *Man.*.....Salt Lake City, Utah.
Utica, Ithaca & Elmira Ry. 4-8½ g. 137 m. 11 lo. 152 c.
G. Jas. Rice, *Pres & Supt.* Horse Heads, N. Y.
J. L. Greatsinger, *Pur. Agt.*.....Brees port, N. Y.
Geo. W. Cleveland, *M. M.*.....Breesport, N. Y.
Wm. Ells, *M. C. B.*.....Breesport, N. Y.
Utica, & Black Riv. R. R. 4-8½ g. 180 m. 12 lo. 327 cars.
J. F. Maynard, *Gen. Supt. & P. A.* Utica, N. Y.
John Bailey, *M. M.*.....Utica, N. Y.
David James, *M. C. B.*.....Utica, N. Y.

V

Vaca Vall. & Clear Lake R. R. 4-8½ g. 30 m. 2 lo. 19 c.
G. B. Stevenson, *Gen. Supt.*.....Vacaville, Cal.
Valley Ry. 4-8½ g. 59 m. 10 lo. 317 cars.
Supt......Cleveland, O.
B. C. Bosworth, *M. M.*.....Cleveland, O.
Chas. Blanchard, *M. C. B.*.....Cleveland, O.
Vernon, Greensburg & Rushville R. R. 25 m.
Horace Scott, *V.-Pres.*.....Greensburg, Ind.
Virginia Midland Ry. *(See Rich. & Dan.)*

Virginia & Truckee R. R. 4-8½ g. 54 m. 17 lo. 375 c.
Carson & Colorado R. R. 3 g. 150 m. 4 lo. 76 c.
H. M. Yerington, *Gen. Supt.*.....Carson, Nev.
R. J. Laws, *Supt.* (C. & Co.).....Carson, Nev.
C. P. Mason, *Pur. Agt.*.....Carson, Nev
I. N. Fording, *M. M.*.....Carson, Nev.
B. F. Lyon, *M. C. B.*.....Carson, Nev

W

Wabash, Chester & W'n R. R. 4-8½ g. 42 m. 2 lo. 32 c
J. L. Hinckley, *Gen. Supt.*.....Chester, Ill.
Wabash, St. Louis & Pacific Ry. (3 Gen. Divs.)
4-8½ g. 3,241 m. 559 lo. 17,230 cars.
John C. Gault, *Gen. Traffic Man.* St. Louis, Mo.
Robert Andrews, *Gen. Supt.*.....St. Louis, Mo.
W. S. Lincoln, *Pur. Agt.*.....St. Louis, Mo.
Jacob Johann, *Gen. M. M.*.....Springfield, Ill.
U. H. Kohler, *Gen. M. C. B.*.....Toledo, O.
(1) Eas'n Div.: J. B. Barnes, *M. M.* Fort Wayne, Ind.
U. H. Kohler, *Gen. M. C. B.*.....Toledo, O.
G. W. Reynolds, *Supt.*.....Fort Wayne, Ind.
Ohio & Ind. Div.
Peru Div.: E. C. Murphy, *Supt.*.....Peru, Ind.
John McKenna, *M. M.*.....Peru, Ind.
Cairo Div.: D. G. Moore, *Supt.*.....Cairo, Ill.
A. Van Tuyl, *M. M.*.....Carmi, Ill
(2) Middle Div.: J. Johann, *Gen. M. M.* Springfield, Ill.
R. M. Hemphill, *M. C. B.*.....Peoria, Ill
Ill. Div.: H. F. Clark, *Supt.*.....Springfield, Ill.
B. B. Rose, *M. C. B.*.....Decatur, Ill.
Chicago Div.: A. A. Hobart, *Supt.*.....Chicago, Ill
Peoria Div.: F. L. Tomkins, *Supt.*.....Peoria, Ill
Wm. G. Hewitt, *M. M.*.....Peoria, Ill
Rant'l Div.: B. F. Mathias, *Supt.*.....Rantoul, Ill.
J. McCarthy, *M. M.*.....Rantoul, Ill.
(3) Western Div.: W. H. Selby, *M. M.*..Moberly, Mo.
C. S. Buck, *M. C. B.*.....Moberly, Mo.
Missouri Div.: R. S. Miner, *Supt.*..Moberly, Mo.
C. B. & O. Div.: J. W. Blanchard, *Supt.*; and
Stanberry, Mo.
Quincy Div.: F. D. Schermerhorn, *S.* Quincy, Ill.
Iowa Div.; E. N. Armstrong, *Supt.*.....Keokuk, Ia
D. Moin. Div.: H. B. Skeele, *Supt.* Des Moines, Ia
Walla Walla & Columbia Riv. R. R. *(see Ore. Ry.)*
Walkill Ry. 4-8½ g. 117 m. 9 lo. 169 cars
G. H. Graves, *Supt.*.....Rondout, N. Y.
J. B. Dykeman, *M. M.*.....Rondout, N. Y.
John H. Decker, *M. C. B.*.....Rondout, N. Y.
Warwick Valley R. R. 4-8½ g. 28 m. 2 lo. 18 cars.
Grinnell Burt, *Pres. & Pur. Agt* Warwick, N. Y.
S. Mills, *M. M.*.....Warwick, N. Y.
Washington & Western R. R. 4-8½ g. 52 m. 5 lo. 83 c.
R. H. Havener, *Gen. Supt.*.....Alexandria, Va.
Edward Dunn, *M. M.*.....Alexandria, Va.
John Harrison, *M. C. B.*.....Alexandria, Va.
Waynesburg & Washington Rd. 3 g. 28 m. 3 lo. 15 c.
J. G. Ritchie, *Supt.*.....Waynesburg, Pa.
G. E. Huggins, *M. C. B.*.....Waynesburg, Pa.
Welland Ry. 4-8½ g. 25 m. 3 lo. 147 cars
William Pay, *Supt.*.....St. Catharines, Ont.
Jas. Taylor, *M. M.*.....St. Catharines, Ont.
Wm. H. Pay, *M. C. B.*.....St. Catharines, Ont.
West End Narrow Gauge Ry. 3 g. 16 m
Rolla Wells, *Supt.*.....St. Louis, Mo
M. M. Hodgman, *M. M.*.....Florissant, Mo.
West Feliciana R. R. 4-8½ g. 27 m. 2 lo. 22 cars
R. B. Belcher, *Pr. & Gen. Supt.* Bayou Sara, La.
J. A. Tilton, *M. M. & C. B.*.....Bayou Sara, La.
West Virginia, Central & Pittsb'g Ry. 13 m. 3 lo. 19 c.
W. E. Arthur, *Gen. Supt.*.....Piedmont, W. Va.
W. T. Blackiston, *Pur. Agt.*..Piedmont, W. Va.
E. W. Lippencott, *M. M. & C. B.* Piedmont.
Western R. R. of Ala. 5 g. 88 m. 3 lo. 270 cars.
Atlanta & W. Point Rd. 5 g. 87 m. 14 lo. 200 c.
Cecil Gabbett, *Gen. Man. & Supt.*..Mont., Ala.
Robert Bibb, *Pur. Agt.*.....Montgomery, Ala.
F. M. Wade, *M. C. B.*.....Montgomery, Ala.
Western Counties Ry. 4-8½ g. 67 m. 8 lo. 137 cars.
J. Richardson, *Supt.*.....Yarmouth, N. S.
Western Maryland R. R. 4-8½ g. 157 m. 16 lo. 394 c.
J. M. Hood, *Pr. & Gen. Man.*.....Baltimore, Md
R. J. Adair, *Supt.*.....Baltimore, Md.
David Holtz, *Mast. of Mach.* Union Bridge, Md
J. H. Nussear, *M. C. B.*.....Union Bridge, Md
Western No. Carolina R. R. 4-8½ g. 134 m. 10 lo.
V. E. McBee, *Supt.*.....Salisbury, N. C.
Geo. P. Erwin, *Pur. Agt.*.....Salisbury, N. C.
G. W. Gates, *M. M.*.....Salisbury, N. C.
Western & Atlantic R. R. 5 g. 138 m. 48 lo. 952 c.
R. A. Anderson, *Gen. Supt.*.....Atlanta, Ga.
W. R. Webster, *Pur. Agt.*.....Atlanta, Ga.
John H. Flynn, *M. M.*.....Atlanta, Ga.
Jno. H. Flynn, *M. C. B. & M. C. B.*..Atlanta, Ga.
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Gen. Man. & Supt.....Norwalk, O.
L. James, *Supt. Mach. & Car Dept.* do.
White Water R. R. *See Ft. W., Cin. & Lou.*
Wilmington & No'n R. R. 4-8½ g. 77 m. 13 lo. 148 c.
J. H. Thompson, *Supt. & P. A.* Coatesville, Pa.
George Rommel, *M. M.*.....Coatesville, Pa.
Alex. Maitland, *M. C. B.*.....Coatesville, Pa.
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R. R. Bridgers, *Gen. Man.*.....Wilmington, N. C.
J. F. Divine, *Gen. Supt.*.....Wilmington, N. C.
John Bisset, *M. M.*.....Wilmington N. C.
W. H. Day, *M. C. B.*.....Florence, S. C.
C. R. Clowe, *M. C. B.* (W. & W.) Wilmington, N. C.
Windsor & Annapolis Ry. 4-8½ g. 130 m. 10 lo. 156 c.
P. Innes, *Gen. Man.*.....Kentville, N. S.
Wm. Yould, *M. M.*.....Kentville, N. S.
Wm. Grierson, *M. C. B.*.....Kentville, N. S.
Wisconsin Central R. R. 4-8½ g. 480 m. 31 lo. 783 c.
F. N. Finney, *Gen. Man.*.....Milwaukee, Wis.
J. W. Curtis, *Pur. Agt.*.....Milwaukee, Wis.
J. R. Henney, *Supt. M. P. & M.* Stevens Pt., Wis.
Mil. & E. n Div.: A. Allen, *S.* Milwaukee, Wis.
W. & No. Div.; G. Campbell, *S.* Stevens Point, Wis
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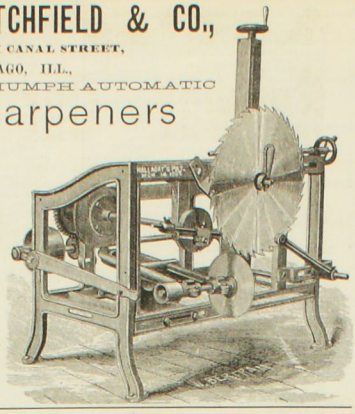

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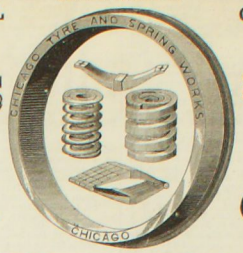

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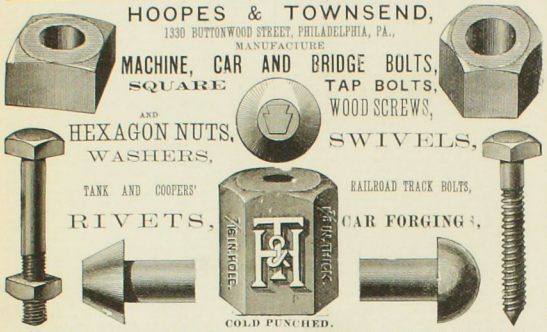

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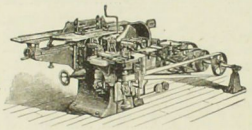

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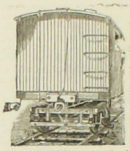

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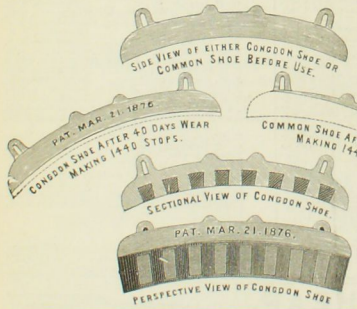

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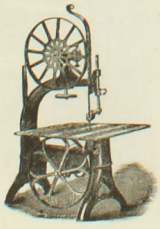

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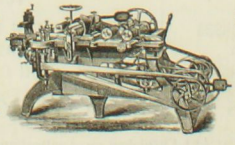

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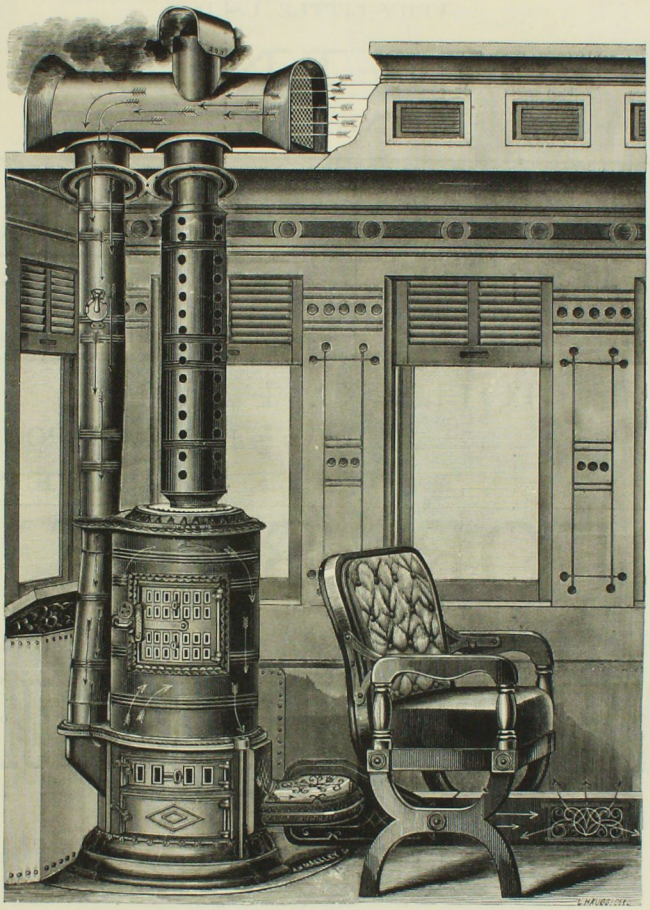

An important feature about our Heaters is the PATENT ANTI-CLINKER GRATE. The object of this invention is to remove the ashes and clinkers from the fire-pot without dropping the fire out. This can be done with less trouble than it takes to rake the old kind of stoves, and a continuous fire be kept going always fresh on the grate. By this means the entire surface of the Stove can always be relied on for heat; but in other stoves when the grate surface becomes covered with clinkers, and the cylinder half filled with ashes and clinkers, only the upper surface will afford heat—thus very often resulting in the overheating and ruining of the stove. With our Improved Crate, the base of the stove is always hot. In this stove we give a bottom as well as a top view of the fire; whereas in all other stoves the fire can only be seen from the top. With this improvement we can always tell when the fire requires raking.

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We invite special attention to the above cut, which illustrates our improved Anti-Clinker Car Heater and Ventilator. Many devices have been tried for heating and ventilating railway cars, and most of them have proven failures, but by our improved plan, cars can be thoroughly heated and ventilated. The fresh air is taken in at the top of the car through the ventilator, passing down a pipe to the base of the stove, around the heated cylinder, and through a 4 × 6 tin pipe along the side of the car, escaping through registers between the seats, thus warming the feet of passengers, thoroughly heating the car, and forcing the foul air out through the top openings. In making the attachment from heater to tin pipe, we use a cast-iron elbow, which makes a complete connection between the heater and hot-air pipes. Persons who travel in railway cars know how uncomfortably hot the seats are near the stove, and how often they are obliged to raise the windows, to the annoyance of passengers at a distance from the stove, who are suffering from the cold; and also how Ill Ventilated most cars are, on account of the air in the car coming in contact with the heated plates of the stove.

Would be pleased to have you consider our Improvement and the utility of using it in your cars.

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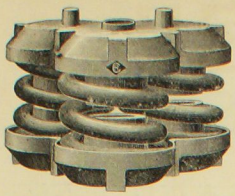

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Capacity..graduated from 5,000 to 30,000 lbs.

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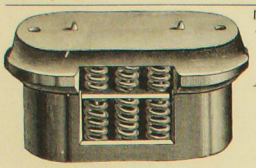

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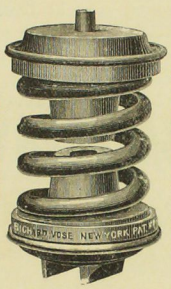

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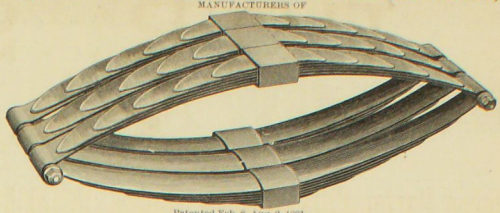

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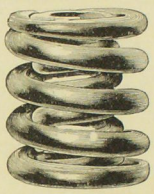

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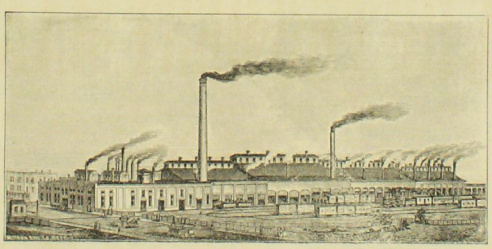

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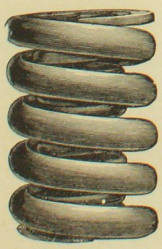

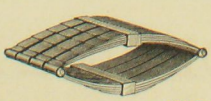

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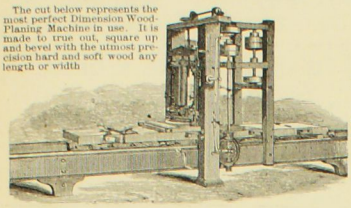

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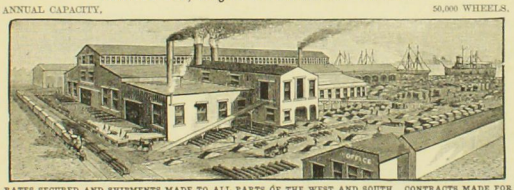

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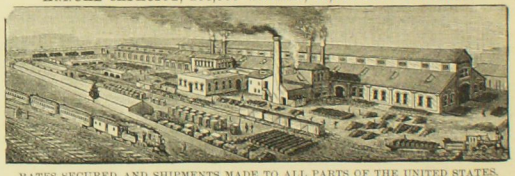

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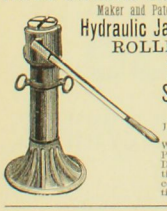

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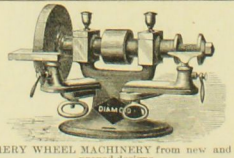

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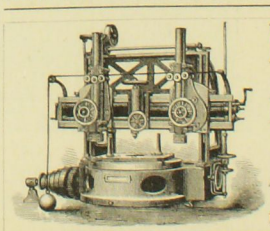

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